American Aviation

APRIL 9, 1956

MANAGEMENT
ENGINEERING
PRODUCTION
OPERATIONS
MAINTENANCE
EQUIPMENT

50 cents

Here's why no other VOR comes close to matching Wilcox VOR performance!

AN AIRPLANE CRASH is a huge capital loss. Because of the unvarying dependability of Wilcox VOR, a nominal investment in this unit might well be considered as inexpensive insurance against such a loss due to faulty navigation. Why is Wilcox VOR so dependable? Why does Wilcox VOR lead the field by far? There are SEVEN BIG REASONS.....

ONLY WILCOX has the Alford, slot-type antenna with no moving parts which makes complete duplication of equipment possible.

ONLY WILCOX has an antenna that is pre-fabricated, lightweight, shipped as a package for fast, efficient field erection.

ONLY WILCOX can achieve constant 1800 rpm signal rotation in countries using 50 or 60 cycle stable frequency power by merely changing one pulley, no other modification necessary.

ONLY WILCOX has an advanced type of modulation eliminator which does not lose RF power.

ONLY WILCOX has complete remote control over one pair of wires; as compared to the usual three.

ONLY WILCOX has an electronic oscillator to generate the FM sub-carrier.

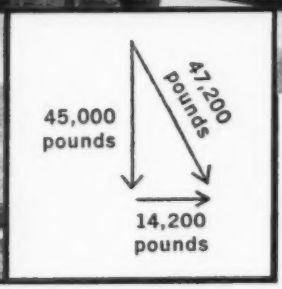
ONLY WILCOX VOR provides these unmatched performance features at a fraction of former costs for the installation of such facilities.

CAA has comissioned installations of Wilcox enroute VOR. Typical users are Signal Corps Army Aviation, Pan American World Airways System, Trans-World Airlines, Government of Belgium, Government of Sweden, Government of Canada, State of Nebraska, State of Minnesota.

wilcox
ELECTRIC COMPANY, INC.
Fourteenth and Chestnut
Kansas City 27, Missouri, U.S.A.

WRITE, WIRE OR PHONE FOR COMPLETE DETAILS ON WILCOX VOR. PHONE BE. 0700.

THIS IS A "CARRIER LANDING"



An example of how Goodyear's huge investment in tire-test equipment and research is paying off in greater aircraft landing safety

Here is a picture of a "carrier landing"—simulated in one of Goodyear's airplane tire-test laboratories. In this case, they are studying the effects of 45,000-pound radial loading and a 14,200-pound side loading—giving a resulting 47,200 tire-loading such as might occur when a carrier-based plane touches down with one wing up 17° from horizontal norm on a small 24″ diameter tire.

To make the test tougher, and even more precise—a one-and-three-eighths-inch bar is laid across the loading platform to duplicate actual landing conditions where a tire smacks across an arresting cable. In addition, the tires, in order to resist "bottoming," are required to contain pressures ranging up to 350 pounds per square inch.

This serves to demonstrate a point.

Through this kind of exhaustive testing, both in laboratory and field—with extensive investments in test equipment—Goodyear earns and maintains a world-wide leadership not only in tire-building but in the engineering of wheels and brakes as well.

This leadership is clearly defined.

More airplanes land on Goodyear Tires, Wheels and Brakes than on any other kind!

Goodyear, Aviation Products Division,
Akron 16, Ohio, and Los Angeles 54, California

FACILITIES + ABILITIES = EXTRA *plus* IN PERFORMANCE

Circle No. 1 on Reader Service Card.

Look to Scott for Oxygen Equipment of the future

Modern Scott Breathing equipment, now in prototype production, introduces a new concept of respiratory protection for passengers and crew during high altitude flight.

Keeping pace with modern jet transports now under construction, Scott engineering and research are continuously developing oxygen equipment that will be standard on the giant Jet-liners of the future.

"THE SHAPE OF THINGS TO COME"

Emergency Passenger Oxygen (illustrated).

Stewardess Pack (illustrated).

Diluter-demand Miniature Panel-mounting Regulators.

Miniature Reducing Regulators.

Trigger Valve to Activate Emergency Oxygen System.

Combination Oxygen outlets.

Today: Scott Products are the Standard of the Industry

5600 Dual-purpose Oxygen
5500 Portable Constant-flow Oxygen
Scotteramic Mask
A-15 L/P Portable Diluter Demand
A-21 Portable Positive Pressure Demand
6380 Oxygen Demand Regulator
MB-1 H/A Oxygen Regulator for Pressure Suits
Scott Oxygen Console for 5
8550 Regulator
Scott AVIOX, "Oxygen for 4"

OTHER SCOTT PRODUCTS

MC-3 Safety Disconnect • Miniature Automatic Pressure Breathing Regulators • Miniature On-off Valve and Oxygen Pressure Reducer Combination • Bailout Cylinder Assemblies • Partial Pressure Suit Systems • 8540 Oxygen Line Flow Indicators • Oxygen Demand and Constant-flow Masks • K-S Disposable Oxygen Masks • Light Aircraft Tailwheel Assemblies • Brake Cylinders • Parking Brake Valves • Control Wheels

SCOTT AVIATION CORP.
212 ERIE STREET LANCASTER, N. Y.

Scott

Int: Southern Oxygen Co., 15 West 57th Street, New York 19, New York. West Coast Office: Fulton-Ventura Bldg., 13273 Ventura Blvd., Studio City, C

Contents

APRIL 9, 1956 - VOL. 19, NO. 23

51,700 copies of this issue printed.

INDUSTRY ROUNDUP

Army Wants More Airpower For Own Needs 21
Congressional Probers Fail To Make Recommendations 22
Russian Tu-104 Jet Transport Is Compromise 24
Allison Drives for Foreign Commercial Sales 36
Wilson Names Murphree Missile 'Czar' 33

ENGINEERING

R&D May Stall Heat Barrier Progress .. 28

ELECTRONICS

First Satellites Won't Have Smooth Sailing 38

BUSINESS FLYING

Cessna Assembling 620 Prototype After Year's Tests 59
Fletcher Builds Passenger-Cargo Version of FU-24 60

TRANSPORT AVIATION

CAB May Be Forced to Conduct Fare Probe 65
How PAA Uses Movies To Train Pilots 66
Western Airlines Strike Cost Nearly $5 Million 67
How Convair Rates Its Medium-Range Jet 70

DEPARTMENTS

Personal View 7
Letters 8
Washington Report 9
Industry News Digest 10
Production Spotlight 16
When & Where 17
Airtrends 18
Pulse of the Industry 77
New Products 45
People 52
West Coast Talk 54
International Aviation 57
Transport Trends 63
Airline Commentary 75
En Route 78

PHOTO CREDITS: Chance Vought, p. 22; U.S. Navy, p. 23; Chance Vought, p. 34; U.S. Navy, p. 37; Cessna, p. 59; TWA, p. 65; PAA, p. 66.

AMERICAN AVIATION

Voice of the Industry Since 1937

Editorial Offices: 1025 Vermont Ave., N.W., Washington 5, D. C., USA. Phone Sterling 3-5400. Cable: AMERAV.

Advertising Offices: LaGuardia Airport, N. Y. Address: LaGuardia Airport Station 71, N. Y., USA, Phone Illinois 7-4100.

WAYNE W. PARRISH, *Editor and Publisher*

ALBERT W. BENTZ, *Managing Editor*
ERIC BRAMLEY, *News Editor* JOSEPH S. MURPHY, *Technical Editor*

DEPARTMENT EDITORS

WILLIAM V. HENZEY, *Transport*
ROBERT M. LOEBELSON, *Military*
HENRY T. SIMMONS, *Manufacturing*
KEITH SAUNDERS, *News Analysis*
ANTHONY VANDYK, *International*
FRANCIS J. KEENAN, *Legislative*
HENRY P. STEIER, *Electronics*
CHARLES SCHAEFFER, *Features*
LOIS C. PHILMUS, *Business Aircraft*
FRED S. HUNTER, *West Coast*
SELIG ALTSCHUL, *Contributing Financial*
MARY L. MILLER, *Rates & Tariffs*
RICHARD SHEARIN, *Dayton*
WILLIAM H. MARTIN, *Art*
LEM A. HUTNICH, *Production*
BERNARD BROWN, *Copy*
JEAN-MARIE RICHE, *Paris*
JAMES H. STEVENS, *London*
JEWELLE MAGARITY, *Airline Statistics*
ARTHUR J. NEWFIELD, *Research Director*

LEONARD EISERER, *General Manager*
WILLIAM H. PEARSON, *Director of Advertising*

BUSINESS OFFICE

Larry Brettner, Manager, Publications Sales; Geneva C. Kinnaird, Circulation Service Manager; Ellen P. Carmody, Advertising Service Manager.

REGIONAL OFFICES

New York City: Administration Building, LaGuardia Airport Station 71, New York, N. Y. William H. Pearson, director of advertising; Menard Doswell III, regional advertising manager; Joan G. Payne, sales promotion manager; M. Michael Cerick, regional advertising manager. Phone: Illinois 7-4100.

West Coast: 8943 Wilshire Boulevard, Beverly Hills, Calif., Fred S. Hunter, manager; John Ball, Jr., Regional advertising manager. Phone: Bradshaw 2-6561, and Crestview 6-6605.

Chicago: 139 N. Clark St., Chicago 2, Ill., Laurie S. Seward, regional advertising manager. Phone: Central 6-5804.

Detroit: 509 Stephenson Bldg., Detroit 2, Mich., Brooks M. Robinson, Regional Advertising Manager. Phone TRinity 5-2555.

London: The AAP Company, 17 Drayton Road, Boreham Wood, Hertfordshire, England. Phone: ELStree 2688. Cable address: STEVAIR, London.

Paris: Jean-Marie Riche, 11 Rue Condorcet, Paris (9e) France. Phone: TRU 15-39.

PUBLISHING INFORMATION

Published: Every other Monday by American Aviation Publications Inc., Washington, D. C. Printed at The Telegraph Press, Harrisburg, Pa. Entered as Second Class Matter in Washington and Harrisburg.

Subscription Rates: For U.S. and Canada—$5.00 for 1 year; $8.00 for 2 years. Other countries—$7.00 for 1 year; $12.00 for 2 years. Subscriptions limited to aviation industry personnel.

Incorporates: Airports and Air Carriers; Aviation Equipment, The American Pilot; Aviation Sales & Service; U.S. Aviation; and American Airports. All rights to these names are reserved.

Change of Address: Send old address (exactly is it appears on mailing label on your copy of magazine) and new address, including zone number if any, to American Aviation, 1025 Vermont Avenue, N.W., Washington 5, D. C. Allow two weeks for changeover.

PUBLISHING CORPORATION

American Aviation Publications Inc.: Principal offices at 1025 Vermont Ave., N.W., Washington 5, D. C. Wayne W. Parrish, president; Leonard Eiserer, executive vice president and general manager; William H. Pearson, vice president and director of advertising; Albert H. Stackpole and Eric Bramley, vice presidents; E. J. Stackpole, Jr., secretary-treasurer.

OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily News service for the entire industry. $200 per year. Managing Editor—Keith Saunders.

American Aviation World-Wide Directory: Twice-yearly listing of products, people, and organizations. $7.50 each. Managing Editor—Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules, fares, World-Wide Edition: $19.50 per year, everywhere. North American Edition: $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert R. Parrish.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Mary Miller.

Airports: Weekly newsletter for airport officials suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

Air Information Divisions: 595 Broad Avenue, Ridgefield, N. J Phone: Morsemere 6-8850. Director—Edward H. Henkler.

Who's Who in World Aviation: First Edition Over 2,000 biographies of aviation's leaders. 345 pp. Deluxe bound. $10.00 per copy, postpaid.

Copyright 1956 by American Aviation Publications, Inc.

BPA NBP

← Circle No. 2 on Reader Service Card.

Now – more wonderful than ever!

WESTERN AIRLINES

Champagne Flights

Luxury beyond compare...but no extra fare!

★ Vintage Champagne ★ Reserved Seats
★ Filet Mignon ★ Orchids for the Ladies

WESTERN AIRLINES

Personal View

By WAYNE W. PARRISH

It's the Season for Going Off Rockers

WHAT in the world has happened to the perspective of newspaper reporters, columnists and radio-TV commentators, to go so far off the beam in reporting the arrival in London of a Russian modified jet bomber?

Give full credit to the Soviets for everything they've been trying to do in the air world, but the Tu-104 "transport" isn't quite the millenium which the British reporters hailed it to be.

For grown-up, supposedly experienced and allegedly mature writers and commentators to go so extravagantly overboard as to say that the Russians have moved ahead of the aircraft builders of the West is the greatest sort of nonsense.

Have the British reporters forgotten completely the commendable advances made by their own country in jets? And have the American commentators decided to overlook all of the enormous progress made in this country?

The hysteria and panic surrounding every Russian air advance is childish. It seems particularly so ever since we visited the Soviet Union a few months ago.

We remember vividly an incident in San Francisco a few years ago. A Norwegian airline friend who had visited Russia in 1946 was on the west coast and in a few hours we undertook to give him a quickie tour of one of the world's most spectacular cities. Naturally the tour led to the "Top of the Mark," the cocktail lounge on top of the Mark Hopkins Hotel.

My Norwegian friend walked slowly around the four sides overlooking San Francisco Bay and the city. It was dusk and the lights were coming on everywhere. He didn't say a word until he had taken in the entire view. Then he stopped, thought a moment, and said: "And America is afraid of Russia!"

There was a lot of impact in that one sentence. Europeans, especially, cannot understand why the great and powerful United States cringes every time the Soviets make some particular advancement, because the gap between the two economies is enormous. Certainly the Russians are trying hard, certainly they've made strides in nuclear and military aircraft fields. It would be strange if they didn't. But for British and American reporters—and such superficial commentators as TV's Dave Garroway—to imply and state that the Russians have forged ahead of the West is both juvenile and dangerous.

All of this points up the stupid approach this country has made in its relations with the world, especially toward Soviet Russia. It is now clear that the rivalry has moved over more to the economic and political realm rather than military. And how are we acting? As usual, behind the times.

Take a simple matter like automobiles. The U.S. is deservedly proud of its enormous automobile production and all of the glitter, appeal and power of the new models. But what sort of automobiles do you think are operated by Americans in Moscow? Our American ambassador has an old black Chrysler. Most of the other cars are old, dark Chevrolets. But even these old cars attract attention in a Russia which has lagged decades behind in automobile development.

Wouldn't you think that one of the most dramatic demonstrations of this country's economic power would be to place at the disposal of the American diplomatic force in Moscow one each of our latest models? They would be sensational. Crowds would surround each one of these cars wherever they stopped in the city. The *only*—repeat *only*—reasonably up-to-date American car in Moscow is a blue-grey Ford owned by a Canadian.

What a showcase we could have behind the Iron Curtain! But has any American automobile manufacturer stepped up to offer one each of his models as demonstrations of American free enterprise behind the Curtain? Has a single bird-brain of the State Department made a move to cut through red tape and get some modern cars where they can do some good? No indeed. It is very difficult to penetrate the Iron Curtain with any sort of information about America. Automobiles would be one of the most effective.

And here is another demonstration which would cause a terrific sensation behind the Iron Curtain. Fly those automobiles to Moscow in Globemasters. The Russians have never seen an airplane like the big Globemaster. Under diplomatic license, the Soviets could scarcely refuse a request by the U.S. to deliver supplies to its own people in Moscow. (Believe it or not, but C-47's now do the job.)

A Globemaster flying to Moscow airport with two or three cars plus other supplies, would be one of the most dramatic and effective bits of public relations propaganda this country could do. Word of such a feat—unheard of in Russian air power—would be passed along all over the country. Why hasn't it been done?

And for a final point, on the basis of our own trip to Russia, we would recommend inviting Messrs. Bulganin and Khrushchev to visit the United States. We would like to have them see the tremendously great city of New York, then quickie visits to Washington (by air over the vast industrial complex en route), then over Pittsburgh to Cleveland and Detroit, then Chicago and hopping to Denver, San Francisco, Los Angeles, Dallas and Fort Worth, then a drive twenty miles up Collins Avenue in Miami Beach in daytime and return at night.

Ignorance is one of the most dangerous things in this world. If the top Russian leaders ever got a good first-hand glimpse of this great country, a lot of nonsense would cease. Or at least they would know whereof they talked. Contrariwise, we recommend for every British and American writer and commentator who praised the Tu-104 into heavenly extravagance a two weeks trip to Russia. It's time a little sanity and reality came into the loose talk going on about the Soviets vs. the West. When Russia completes paving the only highway between its two biggest cities, then there will be ample time to start making a few comparisons.

Letters

More Study Needed

This is written after reading an interesting condensation of the article "The Jet Flap" by I. M. Davidson, published in the March 12 issue of your magazine.

In England, and lately in this country, there is considerable interest in "jet-flap" propulsion systems where exhaust gases from turbojet engines are ducted through the wing and then discharged through a narrow slot along the trailing edge instead of a conventional circular tail pipe.

There is no argument about creating lift by deflected flat jet, at low speeds. However, there seems to be a question of the propulsive efficiency of a flat jet in cruising flight. Recently, we calculated losses in net thrust of the Turbomeca Aspin II ducted fan engine due to change from a circular tail pipe to a slot of the same area, having thickness ratio of .01. Results indicate that over 10% loss in thrust can be expected due to friction losses in ducts connecting the combustion chamber and the slots.

A decrease of 5% in thrust over the 5% usually attributed to the losses in circular tail pipe constitutes considerable power being wasted. For example, Mr. Davidson is talking in terms of an aircraft with 60,000 lbs. static thrust and cruising at 575 mph.

Assuming 50% of rated thrust at cruise:

HP (lost in ducting) = 30,000(.05)-(575)/(375) = 2,300.

The problem is of a fundamental nature and requires close study analytically and experimentally, before the usefulness of jet flap at cruising speeds can be ascertained.

A. N. PETROFF,
Director, Research Department
Cessna Aircraft Co.
Wichita, Kas.

Overlooked: Youth

To the Editor:

As educational consultant for Northrop Aeronautical Institute I have the opportunity of visiting many high schools in Southern California . . . Administrators, counselors and teachers . . . seem interested in the aviation industry as a whole, but they are somewhat lacking in information. NAI is offering a service in the form of a fine motion picture called "People, Products and Progress 1975," a visitation to see aviation, and general counselling service.

With the exception of a service offered by Bendix and the excellent program conducted by United Air Lines, there seems to be no other regular program of providing the high schools with information about the aviation industry as a whole. It is deplorable to me that such a condition exists and it is time for aviation to do what many others have done for years—provide adequate guidance materials and services to encourage students into the aviation field.

After talking to about 2,500 students during the last few months, I am convinced our youth are interested in aviation, if they know something about the aviation industry. We all know how critical a teenager can be about almost anything he doesn't know about, and how enthusiastic he becomes with knowledge and information. I believe the answer to this second observation lies in a concerted effort to provide factual, up-to-date information to students.

A third observation, known by many, is that many potential scientists, engineers and technicians are lost because they do not take the proper courses in high schools . . .

I wonder if there aren't a number of valuable potential scientists and engineers with class standing just under the top students? . . . The industry is continually reminding us that it is not always the top students who make the best enginers. It is much more likely to be the ones who **want most** to succeed at engineering who make the best engineers.

I should like to offer a list of observations [in the order of] importance:

(1) Counselors need adequate guidance materials and services to assist them in their efforts.

(2) The aviation industry should produce and distribute these materials and perform the services.

(3) Students need to hear more about and see more details of aviation in operation.

(4) The scholarship spread should be widened to include definite help to those capable but not yet fully prepared for professional study.

(5) Interest in aeronautical engineering should be weighted as heavily as overall scholarship average when passing out scholarships.

MEL TOWER
Northrop Aeronautical Institute
Los Angeles, Calif.

Presenting the New QWL
Bendix ELECTRICAL CONNECTOR

A HEAVY-DUTY WATERPROOF POWER AND CONTROL CONNECTOR FOR USE WITH MULTI-CONDUCTOR CABLE

This new QWL Bendix* Electrical Connector was designed for and is being used principally on ground-launching equipment for missiles and ground radar equipment.

Obviously, for this important type of service only the highest standards of design and materials are acceptable.

That's why it will pay you to specify the Bendix QWL Electrical Connector for any job that requires exceptional performance over long periods of time.

QWL outstanding features:

1. It combines the strength advantages of machined bar stock aluminum with the shock-resistant qualities of a resilient insert.
2. A modified, double stub thread provides for speed and convenience in mating and disconnecting and the special tapered cross-section thread design resists loosening under vibration. The threads can be easily hand cleaned if contaminated by a substance such as mud or sand.
3. An Alumilite 225 hard anodic finish is used which gives a case hardening to the aluminum surface. This finish offers outstanding resistance to corrosion and abrasion.
4. The cable-compressing gland used within the cable accessory accomplishes both a firm anchoring of the cable and effective waterproofing for multi-conductor cables. Neoprene sealing gaskets are used at every joint to insure a watertight connector assembly.
5. The cable accessory is designed to accommodate a Kellems stainless steel wire strain relief grip for additional cable locking.
6. A left-hand thread is used on the cable accessory to prevent inadvertent loosening.
7. High-grade copper alloy contacts are used which provide for high current capacity and low voltage drop. The famous Bendix closed-entry socket is used for contacts sizes 12 and 16.

*TRADEMARK

Bendix SCINTILLA DIVISION OF Bendix AVIATION CORPORATION
SIDNEY, NEW YORK

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N.Y.
Canadian Representatives: Aviation Electric Ltd., 200 Laurentien Blvd., St. Laurent, Montreal 9, Quebec

Circle No. 3 on Reader Service Card.

Washington Report

More Airpower per Dollar

Aircraft manufacturers can look for more restrictive procedures in government procurement of military materiel. While they have not directly been "butts" of Congressional investigators probing the industry (see page 22), plane makers will have to go along with:

• Closer, more hostile consideration of allowances of overhead items such as bonuses, advertising and contributions.

• A wider, deeper, possibly more efficient intrusion of government procurement and contract administration personnel into areas traditionally reserved for management.

• **Congress generally** is acquiescent to the prospect of continued spending at levels approximating $20 billion annually for military aviation. But there are indications of growing determination to get more airpower for those dollars. Cost-cutting, they believe, can provide both increased military strength and a balanced budget.

Prospects for early termination of the Renegotiation Act have faded. Military services, particularly Air Force, want it continued and the Renegotiation Board's defense of its activities before the Hebert Subcommittee profits hearing drew approval from its severest critics. The outlook: At least a year's extension from the June 30 expiration date.

Cutting Aircraft Lead-time

A significant reshuffling of military aircraft procurement procedures may evolve from a high-level study of U.S. aircraft lead-time problems being conducted within the Pentagon. (See page 26)

Study is aimed at overall aircraft procurement cycle, from conception to production for inventory. Objective is to shorten lead-times.

• **Recommendation** should be ready this summer after study group receives a detailed report on the problem from its staff.

Spending for aircraft gas turbine engines continues to climb. Services are laying out $200 million for development, more than $1 billion for jet engine procurement this year. Comparable figures in 1957 will be $300 million and $1.7 billion.

New Missile Czar

Appointment of Eger V. Murphree as coordinator of various Defense Department missiles programs (see page 33) evoked this comment from Sen. Henry M. Jackson (D-Wash.): "It's better late than never." Jackson two months previously had recommended such an appointment. Another critic of Defense's missile efforts, Sen. Stuart Symington (D-Mo.), withheld comment.

Tools for M-Day

In a move to minimize machine tool bottlenecks in any future emergency, Office of Defense Mobilization is launching a $21-million "phantom order" program that would put tool builders to work immediately in event of war.

ODM says Commerce Department is developing lists of critical tools, that General Services Administration will place $21 million in advance orders for them. Money would cover work for the first six months of mobilization.

However, no actual expenditures will be made under the contracts. They simply will stand on tool builders' books for an M-Day signal from Washington.

• **Joint Chiefs of Staff** will work up civil and military airlift requirements under the present strategic planning setup. Based on past studies by military and civilian agencies, there is not enough equipment owned by the military and airlines to meet mobilization requirements.

Comments Thomas P. Pike, Assistant Defense Secretary for Supply and Logistics, who asked JCS to make the study: "Everybody would like to have all the airlift he could get when the bell rings, and I do not think we have enough to supply everybody with everything he would like to have."

Back on the Track

Dr. C. C. Furnas, who reportedly threatened to resign as Assistant Defense Secretary for Research and Development in a department fight over control of military R&D, now considers his office "back on the track." Defense Secretary Wilson withdrew for "further study" a Feb. 21 memorandum assigning some of Furnas' functions to Frank D. Newbury, Assistant Secretary for Applications Engineering.

• **Furnas agrees** with Wilson that a greater effort should be made to exercise controls in the development-production area, but is not planning to relinquish jurisdiction over development projects as long as he holds his R&D post.

Present status: Furnas is ready to talk about the matter any time Wilson is ready.

Move to Oust Denny

Democratic faction of the Celler antitrust subcommittee can be expected to move for dismissal of Republican CAB Member Harmar D. Denny. Failing this, a transcript of the monopoly hearings (see page 65) would be turned over to the attorney general on argument that perjury was committed.

• **This would be** a political move, aimed at embarrasing the Administration. White House attitude likely would be that Denny will remain, that a perjury charge would not stand up against him. But the Democrats would have gained their full measure of political mileage out of the hearings.

Meanwhile, further hearings before the subcommittee are expected to redound to Denny's benefit. So far, except for his own testimony, only the "other side" has been heard. The subcommittee has declined to call any Board members or personnel known to be willing to support Denny's statements.

Industry News Digest

Quarles and Gen. Twining Agree USAF Needs $18 to $20 Billion for Fiscal '58

The Air Force will need between $18 and $20 billion in fiscal 1958 in order to maintain a 137-wing force, Congress has been warned.

USAF Secretary Donald A. Quarles and Chief of Staff Gen. Nathan F. Twining said they support the proposed $16.5 billion budget for fiscal 1957, but that more will be needed next year.

"In order to maintain the 137-wing force we are talking about today, we will require considerably more money in fiscal 1958," Twining said. "A budget of the size that we have this year will not do it. It is going to take something around $18 to $20 billion a year to operate and maintain this force. If that is not forthcoming, we are going to have to change the force. The (Joint) Chiefs still feel that 137 wings is the force we should have."

•**Meanwhile,** Trevor Gardner, who resigned recently as Assistant USAF Secretary for Research and Development, said USAF's ballistic missile program has all the financial support it needs, but that this support has been at the expense of other crucial R&D projects. This had the net result of reducing the airplane program, which he termed an "unpalatable price."

Gardner told the House Military Appropriations subcommittee that USAF needs $850 to $900 million yearly to support R&D ($610 million is proposed for fiscal 1957), based on present growth plans. "We need to have less controls in research and development so that we can . . . have these new dramatically useful ideas float to the surface and be funded quickly . . . For every person in the Defense Dept. who can say 'yes' there are a very large number . . . who can say 'no,' and there is no penalty for saying 'no'."

He defended the practice of ordering planes into mass production on the basis of drawing board data. The "fly before you buy" plan is being applied to the F-101, F-104 and F-105 fighters "partly for lack of funds which are flowing into the ballistic missile program," he added.

•**In January,** Gardner said, he wrote Quarles that he needed a supplemental R&D appropriation of $178 million for fiscal 1956 and $316 million for 1957. His position was supported by six top USAF officials, including Gen. Twining.

Quarles' reply advised greater selectivity in research projects to avoid dilution of effort, less ambitious qualitative requirements, efforts to shorten the development cycle on urgent weapons systems, cancellation of marginal projects, reimbursement from other government agencies for services rendered, efforts to reduce overhead, and action to limit R&D spending strictly to R&D projects.

". . . If we did all these things he was talking about we would then qualify to submit projects that needed some funding, project by project," Gardner said. "My position was that we were already doing all these things. . . ."

Army Rejects Bids For Training Pilots

The Army last month rejected all bids from private operators to conduct its cargo helicopter pilot training program under contract. The Army said the work will be done at an existing military installation, and that bidders would probably be invited to submit new proposals.

Wolters AFB, Mineral Wells, Tex., was the Army choice of the site of the activity. The base is faced with de-activation because special Army engineer troops presently occupying it are slated to be dispersed throughout the Army.

The Army plan had not yet received Defense Department approval, however, and it was possible that a different arrangement might be ordered. Instead of taking over Wolters, the Army might be required to shift its helicopter training from Fort Rucker, Ala., to Gary AFB, San Marcos, Tex., with the fixed-wing Army training activities there spread among the nine contractors presently supplying primary flight training to Air Force students.

•**The soldiers** are dead set against the latter alternative. They want control of all their aviation training activities, and the latter plan would give control over the cargo helicopter segment to the Air Force, which already conducts primary fixed-wing and helicopter transition training for Army commissioned students.

Wilson Directive May Clear Up News Tangle

Defense Secretary Charles Wilson issued a new directive setting up comprehensive timetables for the release of information on new aircraft, guided missiles and engines by the military services and their contractors and subcontractors.

The order, No. 5230.12, was promptly attacked as a new gag on news dissemination, but Pentagon security officials insisted the new system will go far toward eliminating the confusion that has existed up to now in clearing industry press releases and photos for publication.

•**The new directive,** issued March 27 and effective immediately, breaks down the procurement cycle for new weapons into several broad phases, such as preliminary design and mockup.

The timetables are not meant to allow automatic release of information by the military services or manufacturers. Specific approval of releases must be obtained from the Pentagon in each case, with the timetables serving

Navy's Petrel, Air-to-Surface Missile

Navy's Petrel, produced by Guided Missiles Division of Fairchild Engine & Airplane Corp., is suspended from wing of P2V Neptune. Designed primarily for use against enemy ships at sea. Petrel can be launched by patrol aircraft well outside range of target's air defense. Its intricate electronic "brain" thinks for itself and guides missile to target at high speed.

as guides rather than authority for releases.

Nor are the timetables to be followed as hard and fast rules in clearing releases. Exceptions will be made where new weapons are too sensitive for discussion, or where special considerations merit release of information in advance of the timetable date. An example of the latter situation occurred last month when Air Force Secretary Donald Quarles officially disclosed the Atlas, Titan and Thor ballistic missiles.

Frye Alters F-1 Specs To Increase Capacity

The Frye Corp. this week announced a major revision in specifications for its F-1 Safari transport, changes it says will enable the F-1 to carry double the passenger or cargo load of a DC-3 at lower cost.

Carrying 51 passengers on an average local service flight, Safari's direct operating cost is pegged at .0133¢ a seat-mile compared to .022¢ for the standard DC-3.

A Safari freighter will carry up to 12,000 pounds at a direct ton-mile cost of 10 to 11¢ over distances up to 6,000 miles. Frye officials compare this to a 6,000-pound top payload for DC-3s.

Other specifications:

Gross Weight	37,000 lbs.
Empty weight (cargo)	22,646 lbs.
Cg limits	20 MAC foreward to .36 MAC aft.
Wing span	109 ft. 6 in.
Wing area	1,500 sq. ft.
Fuselage length	75 ft. 10 in.
Tail height	30 ft.

CAA Approves C-46 Design; New Deadline Set

The long-hanging project to get the C-46 transport a full transport category rating moved back into the spotlight at presstime. New developments:

• CAB extended the April 1 deadline for T-category compliance to July 1, but expressed disappointment with progress, particularly since it has repeatedly been advised during the past year that certification was imminent.

• Air Carrier Engineering Services and L. B. Smith Aircraft Corp. of Miami won CAA approval of their C-46/CW20 to operate in passenger service at a gross weight of 47,650 pounds. Company officials propose it to replace high-density DC-3 operations.

• Two other C-46 projects neared completion. Approval for Aircraft Engineering Foundation was expected momentarily. That of Riddle Airlines is not expected to reach approval stage until about May 1.

Temco Offers Model 51, New Jet Trainer

Temco Aircraft Corp., which last month unveiled its Model 58 piston-engine trainer, has disclosed first details of another company-funded development, the Model 51 single jet primary trainer powered by a Continental J69 engine.

The Model 51 was first flown on March 26 and is now undergoing intensive flight testing before demonstration to the military services. According to Temco president Robert McCulloch, the new jet has a maximum level flight speed at least 50 mph faster than the quoted performance of any other fully-equipped single-jet primary trainer.

Specifications include:

Gross weight	4,137 lbs.
Wing span	29.83 ft.
Length	30.6 ft.
Height	10.82 ft.
Wing area	150 sq. ft.
Fuel Capacity	119 gals.
(With extra cells)	165 gals.
Service Ceiling	35,000 ft.
Maximum speed	
Sea level	285 knots
15,000 ft.	300 knots
Cruise speed	
25,000 ft.	215 knots
Rate of Climb (S.L.)	1,900 ft./min.

'Copter Sales Double In Three Years

Military and civil helicopter sales have doubled in three years, according to Aircraft Industries Association's Helicopter Council.

Total 1955 sales were $333.5 million against $165 million in 1952, and backlog at the end of 1955 was $540.1 million compared with $355 million three years earlier. Military sales last year were $260.1 million, while civil totaled $73.4 million.

Delta is Recommended For N. Y.-Miami Route

Delta Air Lines has been recommended by CAB Examiner Thomas L. Wrenn to operate between New York and Miami in competition with Eastern Air Lines and National Airlines.

Wrenn recommended denial of similar applications of Northeast, Pan American, North American, Resort and Riddle. In the so-called "short-haul" phase of the case, he urged extension of National's route from New York to Boston, removal of Eastern's "New England restrictions" and new authorizations for Capital, TWA and United within the general Boston-New York-Washington-Norfolk area.

Northeast was a leading applicant for the New York-Miami route with its strong New England congressional support. However, Wrenn questioned the control relationships existing between Atlas Corp. and NEA. He indicated the record in the New York-Florida Case emphasized the need for a CAB investigation of such relationships.

Parties have 40 days from April 3 to file exceptions and briefs to the Board. Oral argument will probably be held in late May or early June.

AMERICAN AVIATION Moves Washington Headquarters

On April 16, American Aviation Publications moves its main Washington headquarters to *1001* Vermont Avenue, Northwest, Washington 5, D. C. The phone number STerling 3-5400, remains the same.

This represents the fifth expansion move on the part of American Aviation Publications since its inception in 1937. More than 10,000 square feet of space will accommodate the executive, editorial and circulation as well as business management departments. Subscribers to AMERICAN AVIATION magazine are cordially invited, when they are in the area, to stop in and visit these new offices.

(*Continued on Page* 15)

ARMY H-34 CARRIES 2½-TON HOWITZER—At Fort Sill, Okla., a big Sikorsky H-34, newest member of the Army aviation family, carries a 105mm howitzer. This was the first time an artillery piece of this weight, about 5000 pounds, has been delivered by helicopter ready to fire. The H-34 can airlift 17 combat-equipped soldiers.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS

AIRBORNE BULLDOZER—Flying from the escort carrier USS *Siboney*, a Marine Corps HRS helicopter lifts a bulldozer during exercises in the Atlantic. The HRS is a version of the Sikorsky S-55, used all over the world in industry, in passenger, cargo and mail service, and in many armed forces.

LARGE H-34s FOR RCAF—Six new Sikorsky H-34s have been accepted by the Royal Canadian Air Force, the first S-58 types delivered other than to the U. S. forces. The RCAF also flies ten S-55 helicopters, the type operated so successfully under extreme conditions in the arctic, tropics, and remote areas.

IN CALIFORNIA FLOODS—Helicopters went into action quickly and efficiently to save lives and to transport rescue workers, medicine, and supplies in December floods in California, as in Northeast floods earlier in the year. Above, a USAF Sikorsky H-19 of the Air Rescue Service lands in the only spot in Guerneville, Calif., not inundated. Helicopters from the other services also flew hundreds of mercy missions in the disaster. In floods and other emergencies, the versatile helicopter is a key factor in relief work.

HELICOPTER HISTORY

R-5 LIFTS 18 MEN

On Jan. 10, 1946, this Army Sikorsky R-5 set a world record by lifting 2538 lbs. Above, it illustrates this capability by carrying 18 men. On the same day it flew to a new altitude record of 21,000 feet, almost doubling the previous 11,243-foot record. It also set a speed record of 114.6 mph. A Sikorsky S-59 now holds the official world speed record of 156.005 mph.

SIKORSKY AIRCRAFT
BRIDGEPORT, CONNECTICUT
One of the Divisions of United Aircraft Corporation

"Outstandingly reliable"

"Passenger Acceptance... Overwhelming"

"A Money-Maker"

... say leading airlines of the Viscount

TRANS-CANADA AIR LINES. J. T. Dyment, Director of Engineering: "Every department in the Company is most enthusiastic over the results being achieved with the Viscount. From an economic standpoint, the Company feels it has had enough experience already to be confident that *it has a money-maker in the Viscount.*"

CAPITAL AIRLINES. J. H. Carmichael, Pres.: "The passenger acceptance of the Viscount has been overwhelmingly favorable and its *operating performance outstanding.*"

TRANS-AUSTRALIA AIRLINES. E. F. Coate: "With an average of less than one year in service, TAA's five Viscounts carried 230,000 passengers on 6,263 flights with an average load factor of over 85%. They did this with a regularity such as to point to the Viscounts as *one of the most outstandingly reliable aircraft of our time.*"

Such tributes, based on actual airline experience, are most eloquent testimony to the superiority of the Viscount, the world's first and only turbo-prop airliner in service. It has the greatest passenger appeal of any plane of modern times and has proved itself in operation to be one of the most economical and profitable aircraft ever built.

United States Representative: Christopher Clarkson, 10 Rockefeller Plaza, New York 20, N. Y.

turbo-prop VICKERS
POWERED BY ROLLS-ROYCE

VISCOUNT

VICKERS-ARMSTRONGS (AIRCRAFT) LTD., WEYBRIDGE, ENGLAND
Member Company of the Great Vickers Group.

Circle No. 4 on Reader Service Card.

Industry News Digest

(*Continued from Page* 11)

Lockheed Reshapes Engineering Operations

Lockheed Aircraft Corp. last week reshaped its organization to expand the exchange of ideas between its engineers and airlines and speed the flow of aircraft design advancements resulting from service experience.

A new airline operations engineering department, headed by Charles R. Mercer, will pursue three major objectives; improve methods for securing data on performance and operating procedures; monitor operation of Lockheed aircraft to insure top efficiency and safety, and interpret operational problems in terms of design needs.

Whitlock to Head AA Jet Planning

American Airlines, its sights set on 1958-59 operation of Lockheed Electra turboprops and Boeing 707 jets, is gearing its top-level organization for turbine operations.

Marvin Whitlock, v.p.-engineering and maintenance at AA's Tulsa overhaul facility for the past two years, has been named v.p. of operations planning to oversee the transition to new equipment.

J. B. Montgomery, former commanding general of the 8th Air Force who joined American in June 1955, succeeds Whitlock in the Tulsa post.

TWA Promotes Cocke, Leslie, Other Officials

Promotion of several top officials of the company has been announced by Trans World Airlines.

E. O. Cocke and A. V. Leslie, formerly vice presidents of sales and finance, respectively, were advanced to senior vice presidents of sales and finance.

Clyde S. Fullerton, general sales manager, was elected v.p. and general sales manager, and Frank Busch was advanced from general operations manager to v.p.-operations. R. W. Rummel was elected v.p.-engineering, R. M. Dunn v.p.-overhaul and maintenance, and F. G. Betts v.p.-purchasing. Pierre DeSautels, of Paris, was advanced from overseas director to v.p.-overseas.

J. Woodrow Thomas, Washington, civic affairs director, was elected assistant v. p.

News Briefs

MANUFACTURING-MILITARY

• **Bell Aircraft Corp.'s** Texas division applied to CAA for certification of its Model 204 utility helicopter, proposed as a seven-place transport powered by the 770-hp Lycoming LTC-1B (T53) free turbine de-rated to 690 hp.

•**Lockheed Georgia division** asked CAA for "evaluation testing" of its C-130 turboprop cargo transport in connection with "T-Category" approval. The request is not an application for certification, but is a step used by manufacturers on military models to simplify approval processes if civil certification is desired later.

•**Nissho Co., Ltd.,** Osaka, Japan, has been named by Boeing Airplane Co. as its sales representative for commercial planes in Japan. This marks the first time Boeing has been represented by an outside sales representative.

•**Douglas Aircraft Co.,** Tulsa, received USAF contract to overhaul an additional 54 B-47s when present contract on 274 of the bombers ends this fall.

• **Navy will offer** for lease to civil carriers 23 DC-3 type planes, which will require major overhaul to meet CAA and Navy standards before going into operation. Lessees must bear expense of overhaul and other costs. Planes are at Naval Air Station, Litchfield Park, Ariz. Applications, which must be filed by Apr. 12, can be obtained from Navy Bureau of Aeronautics, Washington 25, D.C.

TRANSPORT

•**Hearings** on nomination of James Durfee to CAB membership will be held Apr. 11 by Senate Interstate and Foreign Commerce Committee. However, committee has no plans yet to hear four-month-old CAB nomination of G. Joseph Minetti.

• **Slick Airways** and The Flying Tiger Line have joined the Air Transport Association as associate members. Slick has dropped its $30 million anti-trust suit, filed in 1950 against American, TWA, United and Air Cargo Inc.

•**Ramsay D. Potts Jr.** resigned as president and general counsel of Independent Military Air Transport Association. He will become associate counsel of special Senate Armed Services Subcommittee to investigate U.S. airpower.

•**J. Gordon Bennett** was named executive assistant to Edward P. Curtis, special assistant to the President for aviation facilities.

• **Robert B. Murray Jr.,** former Undersecretary of Commerce for Transportation, was elected a vice president of Pan American World Airways. Recently he has been v.p. and assistant to the president of Baldwin-Lima Hamilton Corp.

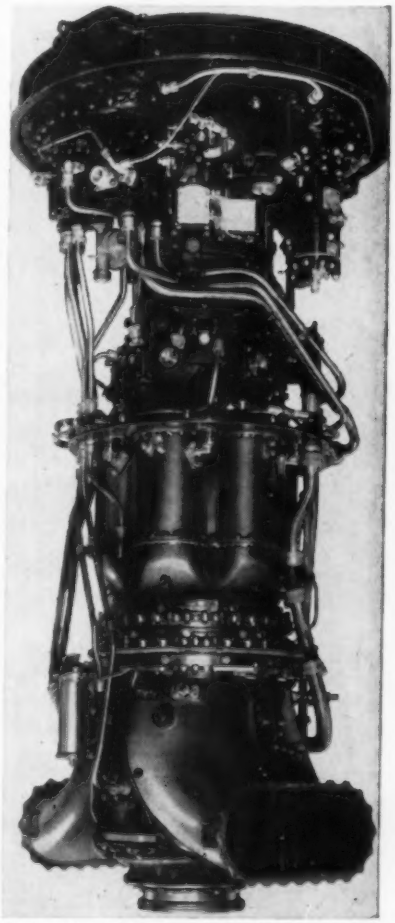
Sir Miles Thomas Quits As Chairman of BOAC

Sir Miles Thomas resigned as chairman and chief executive of British Overseas Airways Corp. and within the next two months will be named board chairman of Monsanto Chemicals Ltd., British subsidiary of Monsanto Chemical Co. He was elected to the subsidiary's board shortly after resigning from BOAC and will become chairman not later than July 1.

Lufthansa Buys 17 Planes

Lufthansa has ordered nine Viscount 810s, four L-1649A Super Constellations and four Boeing 707-320 Stratoliners. The Vickers turboprop transports will be delivered between the late summer of 1958 and the spring of 1959.

New 'Copter Turbine



Design for helicopters is D. Napier & Son Ltd.'s free-turbine Gazelle which mounts in vertical position for direct mechanical coupling to rotor. Primarily developed for Bristol 192 twin-engine naval 'copter, it will also be installed in Westland Wessex, a modified Sikorsky S-58. Gazelle measures 70 in. high, weighs 725 lbs. and has initial rating of 1,260 shp. It has completed more than 60 hrs. bench running to date.

SAVE 10 LBS.*

specify hi-shears®

In weight comparison between HI-SHEARS and high strength close tolerance bolts, per thousand pieces and using a ¼" diameter—⅜ grip length—4650 lbs. shear, the bolt-nut-washer weight is almost double that of HI-SHEARS.

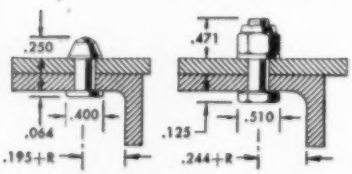
HS52P-8-6	Steel Hi-Shear Pin	9.25
HS15-8	Alum. Hi-Shear Collar	1.32

10.57 lbs.

NAS464P4A7	Steel Bolt	17.35
AN365D428	Alum. Nut	3.40
AN960PD416L	Alum. Washer	.90

21.65 lbs.

Even substituting a 40% lighter titanium bolt for the steel bolt, the bolt-nut-washer combination is still heavier than the HI-SHEAR by 4.14 lbs. per thousand pieces.



Substantial weight savings are also gained by the use of smaller fittings through reduced clearances required by HI-SHEARS.

Write for additional HI-SHEAR data

U.S. and foreign patents — Trademark registered.

hi-shear RIVET TOOL COMPANY

8924 BELLANCA AVE., LOS ANGELES 45, CALIFORNIA

Production Spotlight

• Avco's Lycoming Division is developing the XT55 turboprop engine, an advanced version of its XT53 free-turbine rated at about twice the horsepower for approximately the same weight. This puts it in the 1,500 to 2,000 hp range. XT53 has passed its 50-hour qualification testing. Lycoming has received a firm Navy order for a marine application.

• Lockheed's new F-104 air superiority fighter and interceptor will not carry the Hughes Falcon air-to-air missile. The GAR-1, however, is definitely tabbed for Northrop F-89H, Convair F-102 and McDonnell F-101.

• Shortage of maintenance personnel has forced USAF to put some of its newly delivered F-100 Super Sabres in temporary storage. AF simultaneously is assigning fewer F-100s to its combat units. Stored planes and those deleted from combat wings will be used to equip other combat units ahead of schedule.

• Counting the number of B-52 jet bombers to be ordered in fiscal 1957, the AF will have contracted for more planes than one-for-one replacement of Convair B-36s. Fort Worth produced nearly 400 of the piston-jet intercontinental bombers before phasing out in 1954.

• Report of the Killian Commission to President Eisenhower on Russian and American capabilities, later forwarded to the Air Force for study, and MIT's Lamplight Study for the Navy and USAF, would cost between $850 and $900 million in research and development projects.

• Inflation note: USAF estimates it cost more than twice as much to develop the F-102 as the F-86, while the B-52 cost more than two-and-a-half times as much as the B-36.

• Navy's air-to-air Sparrow program, originally planned in Sperry, Douglas and Raytheon versions, has been reduced to one preferred Sperry production model with the other two developments planned for countermeasures back-up.

• Surface-to-air Convair Terrier has now been changed to one basic design. First efforts called for three different versions, including one with a larger diameter than the others. This would have complicated shipboard handling equipment.

• Navy and USAF are now collaborating on the development of a new air-to-air missile.

• Navy is planning construction of an assault helicopter ship. The ship would carry a complete Marine battalion landing team and all assault equipment, launching enough assault rotorcraft to carry the battalion.

• Gross weight of the Lockheed Electra is up to 112,000 lbs. while the Vickers Vanguard has increased to 135,000 lbs.

• Level speeds of about 400 mph have been achieved by the Viscount 700 prototype in special trials with the Darts running at nearly twice their normal cruising power and gross weight cut to 51,000 lbs. The high-speed trials are part of a development program for the Viscount and the Vanguard. The Viscount 840 will cruise at 400 mph while the Vanguard's cruise speed will be over 400 mph.

• The Napier Eland-powered Convair 340 will be demonstrated in the U.S. in August. It has logged more than 50 hours. Elands have accumulated 7,000 hours' running time, including about 600 hours in the air. Latter figure should be up to 2,000 hours by July. About 40 Elands have been built.

• Goodyear Aircraft has been cleared to use the name of its new ATRAN missile and aircraft navigation system in advertising. Although operating details are classified it is understood to be a non-line-of-sight system and to have potential for both navigation and traffic.

• Air Force is exploring possibility of offering four early-model Boeing C-97s for surplus sale to commercial interests. Aircraft are YC-97s powered by Wright R3350s and are presently classed by CAA as "not eligible for certification" without extensive and expensive modification. Planes are now in Air Force dead storage.

Circle No. 5 on Reader Service Card

When & Where

APRIL

Apr. 9—IATA Atlantic commodity rates board, New York.

April 9-12—Society of Automotive Engineers. National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statler, New York.

Apr. 11-13—Seventh Regional Technical Conference and Trade Show, IRE, Hotel Utah, Salt Lake City.

Apr. 15-16—Ninth Annual Conference, Airport Operators Council, Warwick Hotel, Philadelphia.

Apr. 16-18—Aero Medical Association annual meeting, Drake Hotel, Chicago.

Apr. 22-26—Twenty-ninth convention American Association of Airport Executives, Hotel Carter, Cleveland.

Apr. 23-24—New England Radio Engineering Meeting, Sheraton Plaza Hotel, Boston.

Apr. 26-27—Annual meeting Aeronautical Training Society, Mayflower Hotel, Washington, D. C.

April 30-May 4—Fifteenth National Conference, Society of Aeronautical Weight Engineers, El Cortez Hotel, San Diego, Calif.

MAY

May 1-3—Electronic Components Symposium sponsored by IRE, AIEE, RETMA, WCEMA, NBS, Departments of Defense and Commerce, Department of Interior Auditorium, Washington, D. C.

May 2—Fourteenth annual conference Society of Aeronautical Weight Engineers, Ft. Worth.

May 2-3—Southwest Jet Age Conference, Cimarron Ballroom and Mayo Hotel, Tulsa, Okla.

May 2-5—American Helicopter Society, 12th Annual National Forum, Sheraton-Park Hotel, Washington, D. C.

May 2-3—Air Traffic Conference, spring meeting, Hotel Radisson, Minneapolis.

May 3-4—Sixth annual IAS West Coast Student Conference, Los Angeles.

May 6-9—Second National Flight Test Instrumentation Symposium, Instrument Society of America, Hotel Texas, Ft. Worth, Tex.

May 14-15—National Aeronautical and Navigational Conference, Hotel Biltmore, Dayton, Ohio.

May 24-26—Tenth annual convention of Armed Forces Communications and Electronics Association, Statler Hotel, Boston.

May 27-June 3—Annual Convention, Aviation Writers Association, San Francisco.

JUNE

June 2—Seventh annual maintenance and operations meeting, Reading Aviation Service, Inc., Municipal Airport, Reading, Pa.

June 3-8—Summer meeting Society of Automotive Engineers, Hotel Chalfonte, Atlantic City.

June 4-8—National Fire Protection Association, 60th annual meeting, Boston.

June 6-8—American Society for Quality Control, Palais Du Commerce, Montreal, Canada.

June 17-21—Semiannual meeting American Society of Mechanical Engineers, Hotel Statler, Cleveland.

June 18-21—National summer meeting of Institute of Aeronautical Sciences, IAS Building, Los Angeles.

June 19—Tenth session of International Civil Aviation Organization Assembly, Caracas, Venezuela.

June 20-22—Aviation Distributors and Manufacturers Association 27th annual meeting, Grove Park Inn, Asheville, N. C.

JULY

July 10-Aug. 9—International Aviation Exposition, Mexico City.

AUGUST

Aug. 5-17—IAS National Turbine-powered Air Transportation Meeting, Grant Hotel, San Diego, Calif.

Aug. 22-24—Bendix Scintilla Int'l Ignition Conference, Sidney, N. Y.

marquardt *Announces*

A NEW PROGRAM OF

INDIVIDUAL PROFESSIONAL DEVELOPMENT

for our Engineers

Individual guidance for you by outstanding specialists complemented by company-supported educational programs. Write for details

marquardt AIRCRAFT CO.

Attention: Professional Personnel

Industrial Relations Department • 16552 Saticoy St., Van Nuys, Calif.

THE WEST'S LARGEST JET ENGINE RESEARCH AND DEVELOPMENT CENTER

Circle No. 6 on Reader Service Card.

A U. S. INTERCONTINENTAL MISSILE has now been fired 2,000 miles—more than double the known range of any Russian missile. It's Northrop's SM-62 Snark. But neither it nor North American's SM-64 Navaho has yet been ordered into mass production. USAF still pins hopes on Convair's Atlas and Martin's Titan, both intercontinental ballistic missiles. At present, these would be almost impossible to intercept. Snark and Navaho are air-breathers, using jet and ramjet engines, respectively. Flying at lower speeds and altitudes, they're much more susceptible to interception.

●

DOES RUSSIA LEAD U. S. in combat-ready planes? Indications are that it does not, despite statements to the contrary. For past several years, and again during this year's budget hearings, defense officials have put Soviet strength at 20,000 combat planes, including 3,000 transports. No comparable figures were given for USAF combat units. But that service alone has 21,894 planes in its active inventory. And Navy has 12,570, including 10,000 considered operational.

●

PENTAGON'S NEW TIMETABLE for release of information on planes, missiles and engines will help companies seeking to publicize their defense work (see page 10). Up to now manufacturers haven't had a clear idea when they could expect to release information. Military clearance policies were frequently confused and inconsistent. New system gives companies a timetable on when to seek publicity.

●

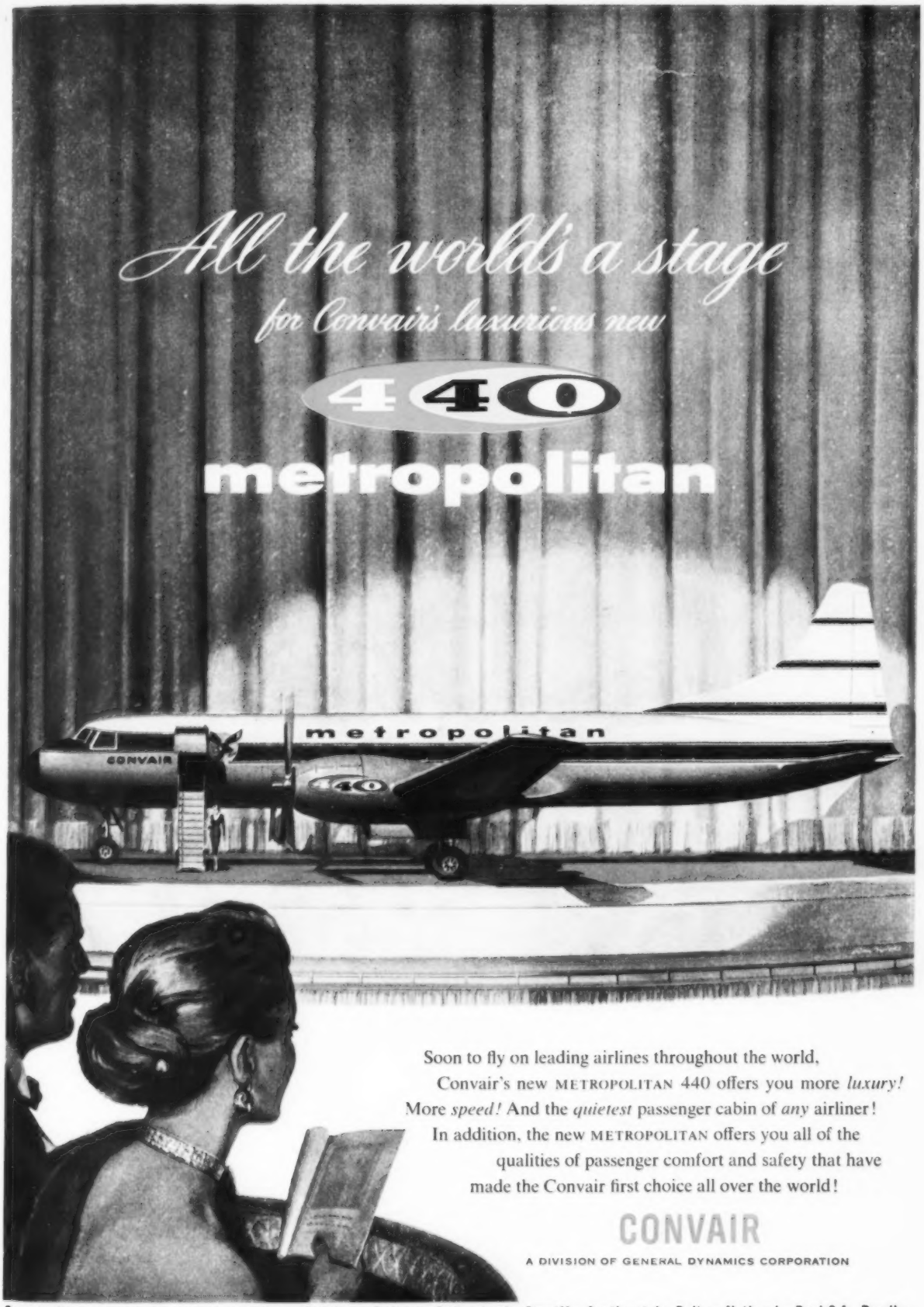
TREVOR GARDNER'S TESTIMONY before House Defense Appropriations subcommittee was something less than dramatic. Many were surprised at the mildness of the former USAF research and development official's criticism. It elicited little response from Democrats interested in embarrassing the Administration. But Gardner is expected to testify at the Symington airpower probe. In the proper setting, his quiet pessimism could have explosive results.

●

ARMY'S DRIVE FOR AUTONOMY in aviation matters rolls ahead. For the first time, Army has ordered a research plane on its own. Previous research-development awards were channeled through USAF and Navy. Fairchild won the $1-million contract for design, construction and test of a VTOL-STOL vehicle. But under present rules, any production contract for the plane will have to go through one of the other services. It's significant that Army now considers itself qualified to make an award. It's had the power all along, but until now has felt uncertain. USAF is expected to be consulted during evolution of the plane.

●

BIGGEST STUMBLING BLOCK in Army's move to gain control of its own aviation training is Office of the Secretary of Defense—not USAF. The latter simply wants to keep its thumb on Army's flying ambitions. But OSD is worried about cost. It's long tried to sell the idea of "cross-servicing" to the military departments as being cheaper and more efficient. So it isn't happy about Army's plan to break away from USAF and get into primary training on its own.



Soon to fly on leading airlines throughout the world,
Convair's new METROPOLITAN 440 offers you more *luxury!*
More *speed!* And the *quietest* passenger cabin of *any* airliner!
In addition, the new METROPOLITAN offers you all of the
qualities of passenger comfort and safety that have
made the Convair first choice all over the world!

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

Soon to fly on: S•A•S, Scandinavian • Sabena, Belgium • Swissair, Switzerland • Braniff • Continental • Delta • National • Real S.A., Brazil • Aero O/Y, Finland • Alitalia, Italy • LACSA, Costa Rica • Iberia, Spain • LAI, Italy

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Breaks the ice faster for flying salesmen

WHATEVER the destination—sales call, board meeting or engineering conference—today's flying executives can't afford to be grounded. That's why most executive planes of twin-engine size or larger are equipped with B. F. Goodrich De-Icers. And why many executives are ordering De-Icers as original equipment on new planes like the Aero Commander (top photo), Beechcraft C 50 (middle) and Cessna 310 (bottom).

B. F. Goodrich De-Icers make ice removal a snap! Small tubes within the De-Icer boot inflate and deflate to snap ice off cleanly into the airstream. The cycle operates automatically.

Modern De-Icers, like those shown above, are tailored to exact shape and simply cemented on without stretching or mechanical attachments. Result: smoother fit, easier maintenance, longer life.

For time-conscious businessmen, BFG De-Icers are low-cost insurance. They save time, eliminate delay, get executives to important appointments in spite of icing conditions encountered on the way.

It adds up to better service from executive planes rolling off production lines today. B. F. Goodrich engineers are ready to assist in the design of De-Icers for original equipment. Put our 26 years of experience in ice protection to work for you by writing . . . *The B.F. Goodrich Company, Tire & Equipment Div., Aeronautical Sales, Akron, Ohio.* Cable TUBEDODGE.

B.F.Goodrich
AVIATION PRODUCTS

Tires, wheels, brakes • De-Icers • Heated rubber • Fuel cells • Avtrim • Pressure Sealing Zippers • Inflatable seals • Rivnuts • Hose, accessories

Circle No. 7 on Reader Service Card.

ESTABLISHED JUNE 1, 1937

American Aviation

VOL. 19, NO. 23

GEN. TAYLOR TELLS CONGRESS

Army Wants More Air Power for Own Needs

Troop transport and close ground support demand more planes for Army purposes, apart from Air Force, Chief of Staff says. View is backed by predecessor, Gen. Ridgway.

By ROBERT M. LOEBELSON

THE Army last week put the Air Force on notice that it would soon be seeking more airlift, better support of ground troops, an expanded aircraft program of its own and perhaps extended range for its surface-to-air missiles.

At the House Defense Appropriations Subcommittee released a transcript of its hearings, one theme seemed to be constant as each Army official, military or civilian, discussed Army aviation. With minor variations, the tune they sang was one of unhappiness with the Air Force's efforts and the conviction that the Army could probably do a better job.

Sample quotations from the testimony:

• **Gen. Maxwell D. Taylor,** Army Chief of Staff—"In the Army Aviation field we are restricted by bilateral agreement, which we freely signed with the Air Force to have no fixed-wing aircraft heavier than 5,000 pounds. That was made several years ago (1952) at a time when it seemed to be a reasonable line of demarcation.

"We see now in the fairly near future types of aircraft which will really be Army type, short takeoff, low performance, which can meet those requirements and still carry heavier loads. *When that time comes I shall attempt to get an agreement to remove that 5,000-pound restriction.*"

• **"At the present time"** the Army has no intention of trying to develop a tactical air force or to request enough funds to make it possible. "I would say the matter is constantly under study *but . . . we are not so recommending now.*"

• **"I join General (James M.) Gavin** in his feeling of the importance of mobility, particularly air mobility within the Army structure. I hope we have made it clear that we are not here looking for our own Air Force, but internal mobility resulting from helicopters and relatively low performance aircraft. This budget will provide us $125 million to go ahead with our program. We have a long one laid out ahead of us for some five or six years. We think that we know where we are going and what we want to do."

• "I would say we are pretty much at a standstill insofar as strategic air mobility is concerned."

• "The troop carrier support of the Air Force is not as ample as I would like."

Ridgway Backs Up Taylor

Taylor drew considerable support from his immediate predecessor, Gen. Matthew B. Ridgway, who said:

• "The Army today cannot depend on the AF for enough troop-carrying planes to lift its planned airborne divisions.

• "Personally, I do not think it (a tactical Army air force) is wise providing you can get the minimum essential tactical air support from the Air Force. . . . But I would raise this point for the consideration of you gentlemen in due course—with the increasing trend of the fighter type of aircraft to greater and greater speed, you very definitely approach the possibility that no pilot can give close direct pinpoint support to ground forces.

"He is going so fast that he cannot identify where he is; he cannot hit the target on the ground he is trying to hit. Every time he fails to do so it means more casualties among the fellows on the ground and more delays in attaining objectives. It is a serious problem and a tough one. Only as a last resort, if all other means failed, would I recommend consideration of the Army having its own close-support aviation comparable to what the Marines have."

• **When he was asked** whether he is satisfied with the way the Army has

General Taylor on Guided Missiles

•"Our Army mission is to destroy an enemy on the ground any place, anywhere. Obviously, range is an advantage for a variety of reasons: Because it gives us greater flexibility in choice of targets, allows us to leave our target system far to the rear and not have it transported forward. We are very interested in being able to use for Army purposes against Army targets any missile of any range."

•"The missile to me is simply artillery. It is a ground weapon which strikes at a distance. Whether it strikes 1,000 yards of 1,000 miles away really does not matter, except there is the practical matter of finding the target and that sort of thing. It performs an Army function that will always be with us, and has always been with us since cave-man days."

•"The only formal restriction (placed on the Army) is in the field of ground-to-ground guided missiles in which we are prohibited from having missiles beyond a certain range . . . (but) . . . I feel no artificial restriction should be placed upon a service that has a product that can be improved."

•"We are the pioneers in this (ballistic missile) field . . . We are the people who have the (maintenance and operation) know-how in this particular field. The fact is that we are the experienced service."

to rely on the Air Force for its airlift, Wilber M. Brucker, Army Secretary, replied:

"I am not satisfied. . . . I feel in this business of talking about the Army being mobile we must be very careful that we do not mislead anybody by letting it stop there. But my concern pertains to who is going to do the job. Where are the planes? How?"

And even Adm. Arthur W. Radford, Chairman of the Joint Chiefs of Staff, admitted the lack of cargo transport planes when he reported, "We cannot airlift a division with full equipment from one part of the world to another, and there is no prospect we can do so in the immediate future."

But the head of the Defense Department refused to be drawn into the Army-Air Force controversy. When he was asked for his opinion about an "Army Air wing," Defense Secretary Charles E. Wilson replied, "There is a study being made of that right now by the Joint Chiefs. I would not care to comment on that until I have the facts before me."

Obviously, therefore, the Army's top leaders are convinced that the appropriate time to register their feelings on missiles and aircraft is not very far off.

Insiders report that the Army Aviation issue did not come up at the recent JCS meeting in Puerto Rico except for a prolonged discussion on one relatively minor point. The full-scale effort, it is said, will now be made in about a month. ◆◆◆

NO SCANDALS TURN UP

Congressional Probers Dig Up Interesting Facts But Fail to Make Concrete Recommendations

By FRANCIS J. KEENAN

Congressional investigators moved ahead last month on three fronts in their multi-pronged probe of the aircraft industry:

• Rep. F. Edward Hebert (D-La.) concluded the airframe phase of his Armed Services Investigations Subcommittee study of financial aspects of the industry with Navy, Air Force and Renegotiation Board witnesses.

• Rep. George Mahon (D-Tex.) issued a 400-page staff study of "flagrant deficiencies" in military procurement practices and policies, but with the spotlight focused on aircraft buying.

• Sen. Lyndon Johnson's (D-Tex.) Preparedness Subcommittee put out a "factual" collection of statistics detailing the airframe industry's 1949-1955 record of executive compensation, including hitherto unavailable figures on stock options issued to and exercised by company officers and directors.

While the three committees operated independently, their work appeared to mesh in an unusually complementary fashion. Together with other materials developed this year the end product seemed certain to comprise the most detailed and comprehensive picture of the aircraft industry ever assembled.

As his hearings at least temporarily closed down, Hebert indicated his interests were channelled in these directions: (1) forcing a uniform system for determining what overhead costs would be allowed on military contracts; (2) encouraging the reinvestment of earnings into facilities by the industry; and (3) generally riding herd on the services as they tighten up procurement practices.

• **Quite clearly,** however, Hebert has dropped any idea he might once have entertained that manufacturers' profits are unreasonably high. Twice he ventured that the industry might be allowed added earnings as a means to greater stability. The Navy would take no position on this point, but the AF directly opposed it, asserting that industry earnings are "reasonable and adequate now."

As indicated earlier, some differences emerged between Navy and AF practices on allowance of contract costs. Principal bone of contention was the Navy's use of "reasonableness" as the standard for allowing bonus payments, including profit-sharing bonuses, to be charged as costs on its procurement. The AF carefully explained they allowed those bonus payments unrelated to a firm's profits, but as of Jan. 1, 1955 denied every new attempt to charge off profits-related compensation.

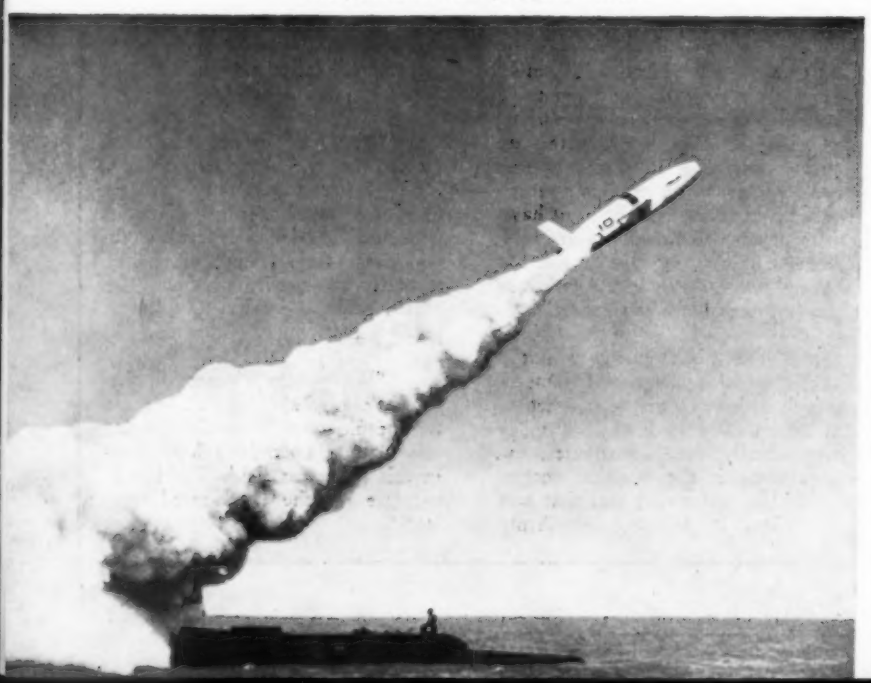
Trade Advertising Permitted

The industry's advertising practices attracted much attention from the subcommittee, but at hearing's end the situation was pretty clear: "Institutional

---

Regulus Takes Off From Sub

First photo of Navy-Chance Vought Regulus surface-to-surface guided missile being fired from submarine. Navy says its first atomic sub equipped to launch missiles, to be built this year, will carry Regulus. The Allison J33-powered Regulus gets initial boost from two Aerojet-General solid propellant rockets



Enter my *new* subscription to

American Aviation

☐ two years $8

☐ one year $5

ing address ☐ HOME? ☐ BUSINESS?

p.o. zone state

pany (type business/service)

Rates shown for U.S.A. Possessions, Canada. all others $2 per yr. additional for postage.

FIRST CLASS
Permit No. 2451
(Sec. 34.9, P. L. &
Washington, D.

BUSINESS REPLY ENVELOPE
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

American Aviation
PUBLICATIONS
1025 VERMONT AVENUE, N.W.,
WASHINGTON 5, D. C.

advertising" in slick-paper, general circulation type publications cannot be allowed as a cost on military contracts; but personnel help-wanted ads, and advertisements in trade and technical publications (which otherwise carry important industry information) are permitted as valid charges.

• **The hearing's** anti-climax came with the Renegotiation Board. Under constant attack by industry and subcommittee for alleged "delays" in processing final company earnings reports, Board spokesmen arrived on the scene on the last day of the hearings already billed as the subcommittee's goat.

But Chairman Thomas Coggeshall attacked first. In aggressive fashion, he made these points firmly:

(1) The Board's work is as up-to-date as it is possible to be—with approximately one year's backlog amounting to some $15 billion of renegotiable sales to process.

(2) The "extremely intricate accounting" involved with incentive-type contracts often delays a company's final report of fiscal year earnings as much as two years, and final reports are often substantially different than preliminary ones, thereby making all earlier processing worthless.

(3) In judging the reasonableness of overall earnings, the Board uses both the net worth and sales factors, favoring neither as a matter of policy. It also considers levels of prior year's earnings, and the additional risks involved in cases of borrowed capital.

(4) The Board makes no management judgments in such areas as executive salaries and bonuses; in general, it follows Internal Revenue Service practice as to allowability of overhead costs, and simply seeks to ascertain proper allocation of costs against a firm's renegotiable business.

(5) The Board has made recoveries of excess earnings in 2,300 of 16,000 renegotiations, and is averaging gross recoveries of $12.5 to $15 million per month.

No Recommendations

Meanwhile, Sen. Johnson's Preparedness Subcommittee collected more than 100 pages of tables listing individual, company and industry compensation paid to officers and directors during the period 1949-1955.

It was exhaustive, certainly, but just how significant remained to be seen. The report drew no conclusions and made no recommendations.

For each officer and director, company-by-company, the report's tables listed all remuneration of whatever kind. It included separate tables for stock options, the number of shares offered and exercised and the price at which the stock was purchased. It listed, too, the stock's value as of Nov. 30, 1955.

• **Both Hebert and Johnson** purposely utilized aircraft companies' own figures in assembling their financial information. The Mahon group, however, went to the procurement records of Navy, Army and AF, and came up with a series of case studies of bad practices, waste, and general inefficiency.

Among its findings, likely to be the basis for directives or recommendations in forthcoming appropriations reports, were the following:

(a) Armed Services Procurement Regulations contain "serious deficiencies"— in policy guidance on the basic cost principles applicable to price redeterminable contracts, in subcontracting, and in handling income from royalties and license fees.

(b) "Frequent delays in establishing firm target prices on incentive and price re-determinable contracts have seriously impaired the Government's negotiating position." incentive-type contracts, instead of being fixed-price, are in fact "flexible" contracts, "and should be called that."

(c) "Unconscionable delays" in formalizing letter contracts have "diluted" Government chances to get fair prices "because the contractor realizes the Government can little afford to cancel work in progress with the attendant production delays and added costs."

(d) "Lengthy delays" in processing and approving engineering changes usually result in increased cost to the contractor and in turn the Government.

(e) "Delayed deliveries are commonplace." "Unrealistic delivery schedules" and "continuous amendment" of the schedules extend delivery dates as much as four years beyond original delivery date. "The original planning and requirements determinations are usually inaccurate and production funds are diverted into research and development activities and often obligated just prior to the close of the fiscal year."

(f) "Cooperation between auditors and procurement personnel . . . should be required." Training programs should be extended and uniform audit procedures prepared.

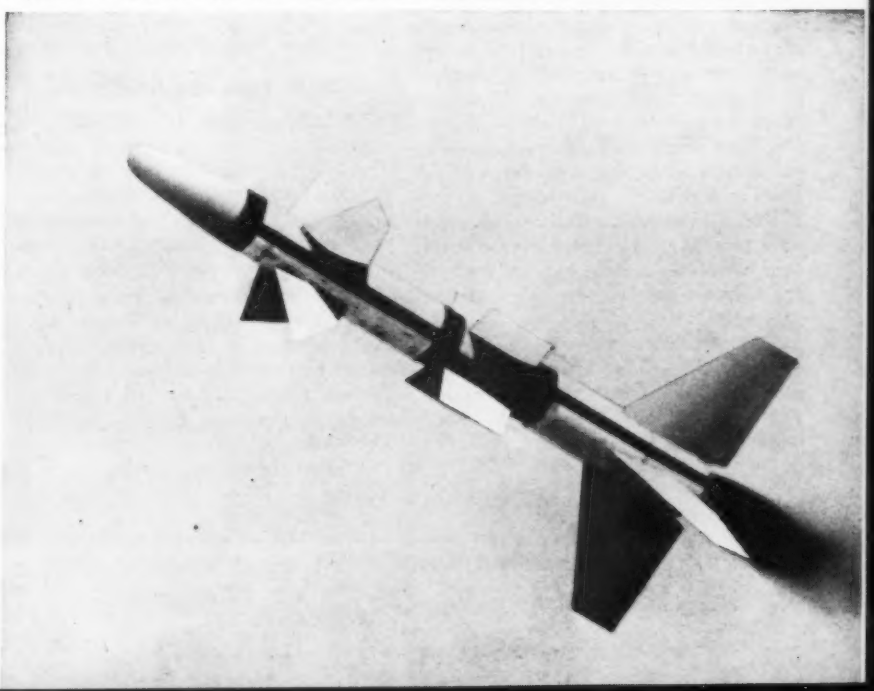
(g) "Weaknesses in requirements computations, inaccurate inventories, inadequate stock records, excessive paperwork, and lack of price control have hindered efficient and economical procurement of spare parts."

(h) "The high rate of turnover of procurement and contract administration personnel . . . has seriously affected the efficiency" of those functions. Training has been "haphazard" and the Government's position in negotiation has been "seriously weakened."

The committee staff had some harsh words for AF and Army liaison personnel, too. While the Navy cooperated fully, they reported, its sister services "hampered" and "compromised" efforts to obtain documents and data for the study. ◈◈◈

Navy Talos Joins Continental Defense

Bendix Talos surface-to-air missiles, similar to this Navy version, will be added to the Continental Air Defense Command arsenal. Air Force version will be of longer range than Navy Talos. Supersonic missile was developed by Bendix and Applied Physics Laboratory of Johns Hopkins University. Powerplant is McDonnell Aircraft ramjet. This is official retouched photo.



Russian Tu-104 Jet Transport is Compromise

Twin-engined plane is 'commercial' version of military Badger; wing design based on high aspect ratio.

By JAMES HAY STEVENS

LONDON—The Tu-104 jet transport which brought General Serov, Russian security chief, to London excited, as was probably intended, more interest than the General.

The sudden appearance of a modern jet transport, unrecorded among official silhouettes, was obviously intended to evoke a healthy respect for Russian air power just prior to the Bulganin-Khrushchev visit and top-level talks. The Tu-104 could be regarded as an earnest of the Red Air Force's fleet of Badger bombers from which it was developed.

In arriving at the Tu-104 formula the veteran Soviet designer A. N. Tupolev and his team were obviously circumscribed by two factors: the need to use as many Badger items as possible and therefore the necessity of sticking to two large engines.

The airplane is, in fact a Badger wing topped by a transport fuselage, but still using the original bomber tail and gear. The writer would sum up that it is a fair compromise on jet transport design based on current knowledge and without following U.S., British or French fashions.

High Aspect Ratio Wing

• **Wing design** is based on a high aspect ratio for good takeoff and range performance. Airfoil is *not* symmetrical and has a full leading-edge radius, another indication of good low-speed characteristics. Thickness is 10% at tip and about 13% at nacelles. The plane has a slight crescent, about 40° sweep inboard and about 35° outboard.

Two fences on each wing separate the airflow where the wing sweep angle changes and at the inboard end of the aileron. Wing weight and fuel capacity have been saved by mounting the main gear aft of the torsion box and retracting it into a nacelle projecting from the trailing edge.

Wing construction is good with spanwise skin stiffeners for torsion box and corrugated inner skin for leading edge. Engine hot air anti-icing is used on the wing leading-edge, with two outlet slots at the tip.

• **Fuselage construction** is less well-finished, suggestive of a prototype. Riveting is rough in places. The manner of skin panel attachment looks as if the longitudinal stiffeners were attached before offering up to the frames. There is considerable reinforcement along the line of the windows and above the wing spar.

The floor line is not level: there is a front cabin with four windows; a lounge with a raised floor over the spar, used as a dining room and galley in the visiting "VIP" airplane; a main cabin with seven windows; a vestibule and, just ahead of the tail, a raised toilet section. The Russians give the load as 50 first class or 70 tourist seats. There are no underfloor holds, freight being presumably stored aft of the main cabin.

The cockpit windows have windscreen wipers and the rearmost triangular window opens for direct vision. There is more roof glazing than usual in a transport. Crew space aft of the cockpit is considerable, while there is a nose navigator's station—with a bomb-aimer's window and H2S radar!

There are front and rear doors on the port side, with a sealed door to starboard near the cockpit.

• **Empennage** appears identical with that of the Badger, including the curiously abrupt dorsal fin. Both fin and tailplane have 45° sweep with about 10% thickness ratio, thus assuring a higher critical Mach number than the wing. Structures are of two-spar torsion box form with separate leading edges. There is no sign of surface heating.

Other Features Analyzed

• **Landing gear** is very tall and looks slender. The main gear has four-wheel bogies with front tension pistons to damp first shock of rear wheels touching. Twin nosewheels are used with hydraulic dashpot steering. Tire pressures are lower than Western practice.

• **Flying controls** do not appear to be power-operated. The ailerons have sealed pressure balances, while the rudder and elevators have inset-hinge aerodynamic balance. All surfaces are tabbed for trim. Extension trailing-edge flaps are fitted.

• **Power units** are the big question mark. The airplane is about the size of the Comet 3 and would be expected to gross around 150,000 lbs. (It may not, since Soviet economy usually prefers prestige to payload, as witness the seating in the Aeroflot DC-3s, Il-12s and Il-14s.)

The air intakes and power-plant bays are big. One would guess at least 15,000 lbs. thrust per engine, but it could easily be 18,000 lbs., or even 20,000 lbs., depending upon engine efficiency.

The dimensions do not rule out the possibility of by-pass jets—which would be far less hazardous for the close-to pressurized fuselage. The jet pipes are slightly splayed out and there are large fillets to take the initial jet buffeting, but even so it is close for such high powers.

The engines are mounted behind the wing spar and the nacelle line lies mainly below the wing. This would give a clear duct run under the torsion box, with low structure weight and low duct losses.

Performance Claims Reasonable

• **Performance:** The Russians claim of 500 mph plus cruising speed seems perfectly reasonable, as is that for a maximum range (presumably stage length) of around 2,000 miles. Cabin differential is low, giving a cabin altitude of 9,000 ft. at 33,000 ft., at 6.25 lb./sq. in. Individual oxygen is provided at each seat. The airplane flew the 1,600 miles from Moscow to London at a block speed of 447 mph, which confirms the speed claim.

The Russians claim that it has more radio and radar aids than any other transport—this is surely true of the visitor. Although it still has the characteristic Soviet "washline" mf antenna from cockpit to fin, it has VHF, UHF external and suppressed aerials, some most unusual ones along the cabin roof, radio altimeter and H2S. It has no visible homing device however.

Moscow radio publicity about the Tu-104 being in full production probably presages an external sales drive to satellites and sympathetic countries—such as India—which would be offered very favorable terms.

In full Aeroflot markings, the Tu-104 made an impressive sight on its arrival at London Airport late last month.

Nose of Tu-104 manifests use of Badger bomber components in aircraft. Navigator's and bomb-aimer's positions are clearly visible.

Grossing about 150,000 lbs., Tu-104 must have exceptional powerful engines. Each of two powerplants must develop at least 15,000 lbs.

RED ADVANCES POSE SERIOUS PROBLEM FOR U.S.:

How to Cut Lead-times on Combat Aircraft

By HENRY T. SIMMONS

IN THE midst of continuous battering from Congress for waste, poor management and delays in aircraft procurement, the Pentagon is quietly conducting a study which could lead to drastic changes in its organization and methods for getting new aircraft.

The study is aimed at the question: What can be done to compress lead-time in designing, developing and producing U.S. military aircraft? Looking for the answers is a top-level, eight-man Pentagon committee headed by Deputy Defense Secretary Reuben Robertson, Jr.

It is far too early to predict the outcome of the study, since it is still in its formative stages. But these broad possibilities exist now, and may become more certain later on:

•For the services, more streamlined research, development and procurement organization with greater control in the hands of individual project officers.

•For industry, a restoration of some of the management control functions taken over by the services since World War II.

Worried by Russian Progress

•**The Robertson group** was created last Sept. 30 in response to the remarkable accomplishments of Soviet Russia in bringing new fighters and bombers into large-scale production. The Moscow air display of last May made it painfully clear that the Russians were out-producing the U.S. in advanced jet day fighters and heavy bombers, and that they were rapidly closing the gap in other areas.

More ominous yet, there were indications the Soviets had succeeded in shortening their lead-time cycle for new combat planes to a period substantially less than that achieved in this country. Gen. Thomas White, Vice Chief of Staff of the Air Force, warned in February that the Russians "have halved our lead-time on the heavy jet bomber (about eight years for the B-52), and in developing and producing all other aircraft, their lead-time is considerably less than our own."

This raised the grim possibility that the U.S., unless it drastically improved its procurement practices, was inexorably doomed to fall behind the Russians in the all-important business of supplying its combat arms with qualitatively superior aircraft, and that this would take place regardless of the amount of money spent for modernization of equipment.

To develop faster means of transforming new aircraft from paper concepts to actual hardware in the U.S. inventory, Defense Secretary Charles Wilson set up the Robertson "Ad Hoc Group for Aircraft Production." Besides Robertson, the members include Vice Chairman Frank Newbury, Assistant Secretary of Defense (Applications Engineering); Wilfred McNeil, Assistant Secretary of Defense (Comptroller); Thomas Pike, Assistant Secretary of Defense (Supply and Logistics); Dr. Clifford Furnas, Assistant Secretary of Defense (Research and Development); Charles Finucane, Under Secretary of the Army; Thomas Gates, Jr., Under Secretary of the Navy, and James Douglas, Under Secretary of the Air Force.

•**Initial objective** of the Robertson group is a detailed study of the present U.S. cycle for design, development and production of manned aircraft weapons systems, including helicopters. A staff is presently working up the study, with hopes of completing it this summer. Directing the work is David L. Chewning, 35, a soft-spoken management consultant expert from Atlanta, Ga., with experience on both the Cooper and Hoover studies of Pentagon organization.

The staff study, according to Chewning, will be primarily a description of the complex process of getting new aircraft into military inventories. He describes it as a standard management survey technique used in private industry to develop more effective organization and processes.

"We are accumulating a carefully-planned body of facts. We will sort them out, package them and lay them before the Robertson Committee," he explained. "We are looking for the basic organization and systematic concepts by which we obtain aircraft. We are trying to appraise the present system in terms of its fundamental objective."

The staff study may propose a "model" military aircraft procurement organization, showing a reduction in the number of boards, panels, reports and reviews which would be required under a streamlined system. But basically it is a fact-finding effort, with ultimate recommendations to be left to the Robertson Ad Hoc group.

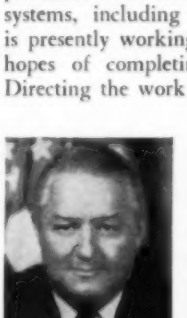
•**Chewning made these points** about the study, which will be classified in its final form:

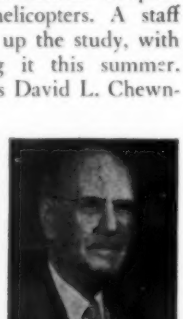
•The study will examine current procurement practice and will not go in for extensive historical detail. "We don't want a parade of horrible examples."

•It will be primarly concerned with time; to a lesser degree with money.

•It will not be concerned with the Soviet industrial organization. "We want to correct our own system, not copy the Soviet system."

•It probably will not attempt to set up an ideal timetable of days or weeks of lead-time required for each step of the long procurement process, since this would be of questionable value.


Robertson


Newbury

Douglas

Pike

McNeil

Finucane

Gates

Furnas

•**First phase** of the study, or "reference manual," will be a description of the military procurement organization and processes. It involves the identification of each segment of the government which has any role in the development and production of aircraft, plus an examination of the inter-relation of these governmental units and the paperwork and technical procedures employed by the Defense Department and the military services.

In the second phase, the study will deal with appraisals of the problem from experienced persons in both industry and the military services. Representatives of Boeing, Convair, Douglas, Lockheed, Martin, North American, General Electric, Pratt & Whitney and 10 other airframe, engine and component manufacturers have already unburdened themselves to the study staff, primarily to assist it in spotting trouble areas.

14 Questions Answered

The industry people answered 14 questions put by the staff, many of them touching sore points in military-industry relations. Would greater design freedom for contractors cut lead-time? Should production problems get more attention during design engineering? Can management of engineering changes be improved? What about the weapon system form of contracting? Among the other points considered were the nature of design specifications, the frequency of military review, adequacy of production and test facilities, the quality, quantity and timing of government-furnished equipment, legal obstacles to efficient procurement and the effect of rotation of military contracting personnel.

Chewning and his staff made a preliminary report to the Robertson group late last month, but much work remains before the group can present its recommendations. What these will be, nobody knows. But certain broad problems are almost certain to get attention, among them:

•**Formulation** of General Operational Requirements for new aircraft.

The process of drafting a weapon requirement is peculiar to the military function, with much pulling and tugging between commanders, and therefore compromise, before a final requirement is drafted. Does the GOR make good sense from an engineering standpoint? How adequate is the appraisal of the GOR in terms of the state of the art? Too ambitious a GOR could force tedious delays, large unforeseen R&D expenditures and unexpected drains on scientific and engineering manpower—and consequent lags throughout the entire procurement system.

•**The internal organization** of the military services from a design, development and production standpoint.

How efficient is the military organization in moving an aircraft from paper requirement through design to hardware inventory? How many built-in roadblocks are there to speedy procurement? Who make the decisions, and what is their relation to the individual project? How much of this decision-making is excess, and how much of the devious paperwork and study-review process was created to deal with symptoms rather than basic causes?

How to Streamline?

Above all, what can be done to streamline the system? In this connection, industry representatives have called attention to the growing practice in recent years among large corporations of superimposing a vertical type of organization headed by a project director on the conventional horizontal form of organization—Finance, Production, Sales, R&D, etc. All decision-making power is consolidated in the project director, with no power of veto left in the regular divisions.

•**The effect** of intensive controls imposed by the government on management operations of contractors.

Since World War II, the military services and particularly the Air Force have become increasingly dominant in the intimate details of company management, primarily with the objective of protecting the taxpayer's investment. Aside from its economic and political implications, what is the effect of this control in point of time?

A new clause in Air Force contracts gives that service complete power over master planning schedules of contractors (See Box), and consequent control of every detail of their operation—tooling, materials purchase and delivery, hiring levels, training, financing and the like. Since many of these decisions are highly technical, advice must be sought elsewhere, and delays of weeks or even months are possible as lieutenant-colonels and GS-13s (civilian executives) ponder decisions normally made by experienced aeronautical engineers and production men.

Do Odds Favor Russians?

In the battle to compress aircraft lead-times, the odds would appear to favor the Russians. Assuming that neither this country nor Russia can fabricate and assemble pieces at a faster rate than the other, these big advantages rest with the Soviet:

•Decisons can be rammed through the Soviet system with less attention to protocol, less "coordination" than characterizes the U.S. system.

•The Soviet plane-builders do not have to worry about each ruble spent for aircraft development and production in the same way U.S. military services and aircraft manufacturers must. Fewer review boards mean faster decisions, bigger risk on urgent projects.

On the other hand, the U.S. is working from a free enterprise system which offers the highly tangible incentive of financial reward for inventiveness. Other less tangible advantages lie with the U.S. such as political freedom.

Despite the edge the Russians may appear to have as far as speedy decisions are concerned, the Pentagon men are confident that substantial improvement in U.S. procurement techniques can be achieved without departing from the basic principles of the American system.

If they are right, and the study of manned aircraft produces significant results, it's likely that a similar approach will be tried with respect to other complex fields such as guided missiles and electronics.

How AF Controls Output Of Aircraft Companies

"Control of Production (b)" is a new clause which the Air Force has begun to insert in its contracts with aircraft companies. It illustrates the extent to which the services have invaded company management, a trend which many believe is partly responsible for long U.S. aircraft lead-times.

"(b) The contractor shall submit to the Contracting Officer . . . the planned manpower requirements and a summary master schedule indicating the planned dates for starting and completing production engineering, production planning, tool design and manufacture and production lots; placing purchase orders for subcontracted and other material items, and for shop completion and delivery of the aircraft called for herein; and a schedule showing as of the end of each month the cumulative percentage of cost estimated to be incurred in performance of this contract. Any revision of the planned manpower requirements or master schedule shall be transmitted promptly to the Contracting Officer. *Any change with respect to the master schedule, or amendments thereto, desired by the Government shall be negotiated as a change under the clause of this contract entitled 'Changes'.*"

Bell X-2 to Resume Flying

Bell Aircraft's X-2 research plane is slated to resume flying soon. The stainless-steel rocket-powered aircraft has been out of commission since November for work on the powerplant. Destined to attain speeds of 2,000 mph, the sweptwing X-2 has made a total of five flights, the first four having been unpowered glide tests.

R&D Feud May Stall Heat Barrier Progress

Furnas-Newbury dispute aired at Los Angeles meeting; Convair expert says big gap in knowledge exists beyond Mach 3.5.

By JOSEPH S. MURPHY

A top-level Pentagon battle for control of the nation's research and development effort has moved in as a third big obstacle in aviation's path through the "thermal barrier" to high-speed flight.

Not that any new complications are needed. For the gigantic technical challenge posed by aerodynamic heating at high speeds is already a double-barreled problem.

It's not only a matter of solving known engineering puzzles to build an aircraft for routine operation at speeds above Mach 1.5 (1,150 miles per hour). At Mach 3.5 or perhaps slightly higher, the search for these answers is further compounded by a serious gap in our knowledge of what all the problems actually are.

This was the perplexing picture evident to more than 2,000 engineers and scientists attending the American Society of Mechanical Engineers' aviation division conference n Los Angeles recently.

• **During a symposium** on "Thorns in the Thermal Thicket," Convair's v.p. engineering R. C. Sebold and Boeing's chief of technical staff George S. Schairer spearheaded a comprehensive treatment of many of the problems and some new answers on the technical side of high-speed aircraft design.

But at a behind-the-scenes ASME press conference, Asst. Defense Secretary (R&D) Dr. C. C. Furnas made no secret of the fact that he and his counterpart in Defense applications engineering, Frank Newbury, are locked in a struggle for development authority.

Dr. Furnas said Defense chief Charles E. Wilson will eventually resolve the jurisdictional dispute, but intimated he would resign if his viewpoint is not accepted.

Although Wilson has since recalled "for further study" an order that split the R&D authority between Furnas and Newbury, it is by no means a dead issue and its impact on progress toward solving the problems of high-speed flight are plain.

• **Under the split-authority plan,** one Defense official (Newbury) would have control over the technical aspects of all development projects, many of which presumably involve so-called "thermal barrier" problems.

Left to Furnas as Asst. Secretary-R&D would be projects exclusively of a research or exploratory nature, also obviously allied to solution of the heat problem.

But the big question still to be resolved is whether the scope and complexity of the future aircraft and missile research problem can stand any deterrent that would obviously arise from confusion at top levels of its administration.

And it's obvious that only a quick but thoroughly thought-out decision in the Newbury-Furnas dispute will answer this question.

Bringing the technical problems of the heat barrier into clearer perspective at the ASME session was Convair's R. C. Sebold.

Of aircraft structural materials, he pointed out that aluminum alloys can't be pushed much beyond Mach 2, and that titanium—heralded as a substitute for aluminum at higher temperatures—carries us only from Mach 2 to about Mach 3.5.

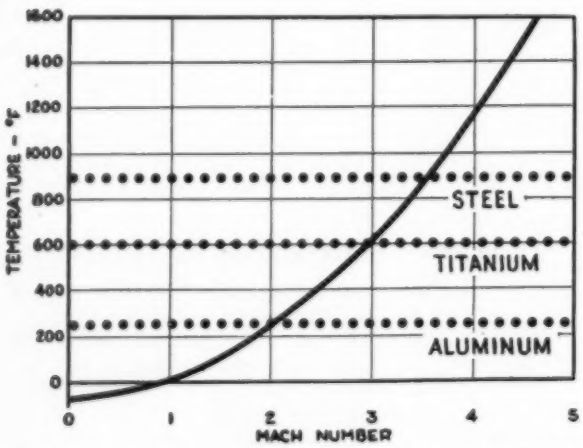
At this point the game of substitution is almost played out. Steps he views as possibly adding to the life of current materials are: (1) insulation of load-carrying structures from heat sources and (2) strategic refrigeration. Sintered cerements also show some promise.

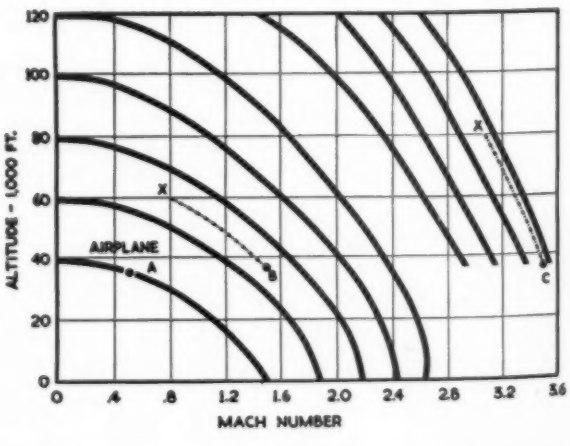
• **But while** these solutions may not be scientifically difficult, Sebold feels the engineering problems they pose are "most discouraging."

And at speeds only slightly higher than Mach 3.5 (2,700 mph), it is no longer purely a problem of lacking knowledge for the solutions, but we face a serious gap in our knowledge of the problems.

Sebold's reasoning—at higher temperatures and pressures the air can be disassociated into separate gaseous components. At still higher figures, electrons can be displaced and the air can become ionized. Some exploratory tests into this region have indicated chemical reactions as well as mechanical reactions.

On the "urgent" list to extend the





How current aircraft materials fit the temperature pattern as speeds approach the "thermal barrier." At right, constant energy curve shows how high-speed interceptors (B & C) can trade speed for altitude compared with subsonic aircraft (A).

10 YEARS

of production service to

THE AIRCRAFT AND MISSILE INDUSTRY!

Initiating production at the dawn of a new era of high speed, high altitude flight, G. M. Giannini & Co., Inc., has steadily progressed to become the largest manufacturer of telemetering and control instruments in the country.

Today, virtually all operational military aircraft use one or more of the 30,000 instruments produced annually by Giannini—instruments which have earned an enviable reputation for high accuracy and consistent reliability.

Young in years, old in experience, Giannini, entering its second decade of operations, offers to its customers the accrued benefits of greatly increased facilities and accumulated engineering and manufacturing skills developed through ten progressively successful years of service to the aircraft and missile industry.

Engineering positions are open at several Giannini locations for career-minded young men—write for details.

Airborne Systems

Digital Data Recording Systems

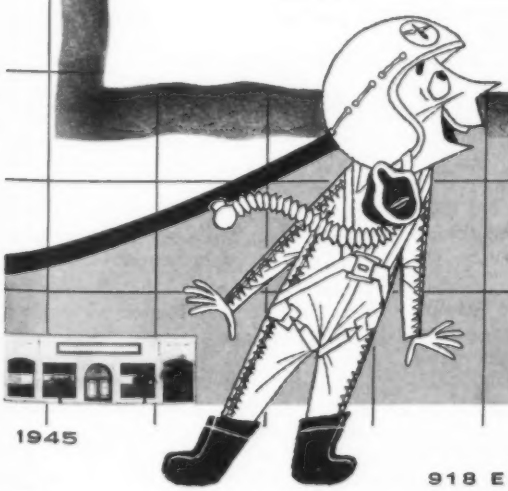
Switching Commutators

Custom Precision Potentiometers

Pressure Transducers

Gyro Instruments

Accelerometers



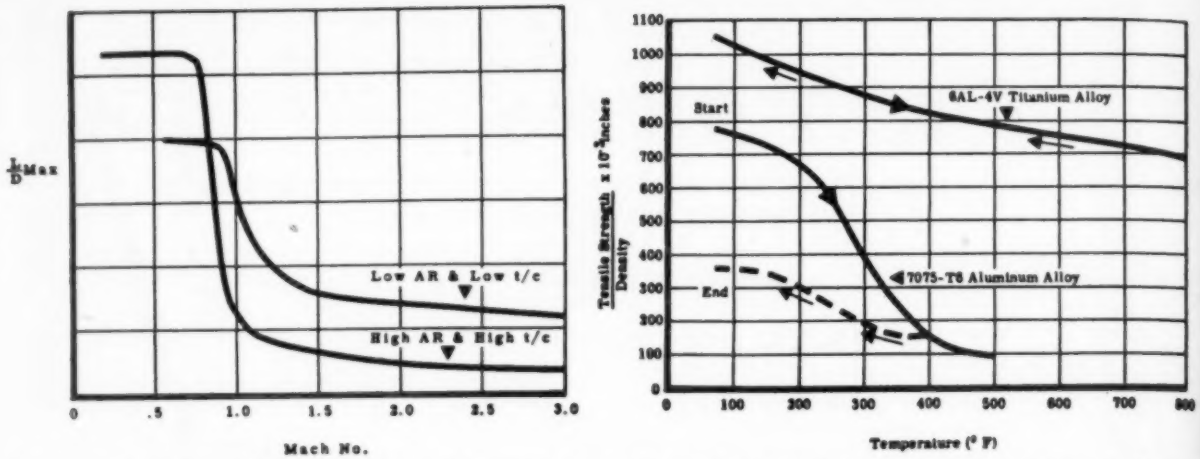
Giannini

1945 1955

G. M. GIANNINI & CO., INC.

918 EAST GREEN STREET • PASADENA, CALIFORNIA

Circle No. 8 on Reader Service Card.



Performance shapes tomorrow's aircraft. Graph at left shows how low aspect ratios and wing-thickness ratios excel at high speeds. Chart at right plots superior strength recovery of titanium alloy to that of aluminum after heating.

bounds of our scientific knowledge he lists:

•Fundamental studies of heat transfer both from gases to solids and within solids.

•Studies of the nuclear bond within solids.

•Studies of why the effects of temperature bring about the loss of structural strength.

Why High Speed?

Why do we continue to push for higher speeds with all the problems it presents? For military interceptors as an example, Sebold points to the sharp rise in speed and altitude performance capability just from the exchange of kinetic to potential energy.

Disregarding airplane drag and engine thrust, he demonstrated how an airplane traveling at the subsonic rate of Mach 0.5 at 35,000 ft. has a top exchange of kinetic-potential energy of only 5,000 ft. in additional altitude (see chart) and its airspeed becomes zero.

But if this interceptor were traveling at Mach 1.5 at 35,000 ft. and traded speed for altitude, it could climb to 60,000 ft. and still have a speed of Mach 0.9.

By hiking this speed even higher, say to Mach 3.5 at 35,000 ft., the interceptor could "zoom" to 80,000 ft. and still be flying at Mach 3. This airplane, says Sebold, also could maintain this altitude while decelerating and operate normally.

And solving the aircraft structural problem to sustain these high speeds isn't the only hurdle in the path of Mach 3 plane design. Stability and control, Sebold says, is another area which may require a fresh approach to maintain our past steady progress.

Reason is that, in the thin atmosphere at higher altitudes, airplane mass is very great in comparison to its environment and the problem approaches that of outer space. Either lower control effectiveness or sluggish response must be accepted, or other special means must be used to maneuver the Mach 3 aircraft.

To prove his point, Sebold points to the problems "not entirely anticipated" in the century series of fighters and interceptors now going into operational service. There is the so-called "JC Maneuver"—a pilot-induced pitching oscillation which cannot be controlled by the pilot once it is created.

Another, growing out of the use of low-aspect-ratio wings and of carrying engines and large masses of fuel in the fuselage, has changed the inertia relationship of the airplane. This, says Sebold, has brought about inertia couplings and "no few headaches."

Boeing's George S. Schairer told the ASME session that sooner or later the designer will have to contend with the high temperature problem and abandon use of aluminum and magnesium for structures.

Looking at the high-speed problem of large aircraft (those with high payloads, long range), he sees much incentive for use of titanium in sandwich form in structural designs. The reason—a sandwich titanium structure can be quite competitive with aluminum structure at room temperature. And the use of steel in stiffened structures will seldom be desirable.

Schairer looks at suitable titanium alloys and methods of fabricating them into workable sandwiches as inevitable, and a most important materials, manufacturing and development problem.

And the materials problem is not simply a case of finding a structure that will withstand expected temperatures. Schairer says it is most important for the designer to understand, too, the low-temperature properties of materials after they have been subjected to high temperatures for long periods.

For example, tests with aluminum showed the material was changed by prolonged heating to the extent that its low-temperature characteristics were considerably reduced after heating and cooling (see chart). This, he feels, makes it a dubious material for use in aircraft flying above Mach 2.

But such is not the case with titanium. No deterioration was evident in titanium alloy—it regained its initial properties when heated and returned to low temperatures.

And there are other problems beyond the heat barrier. Aside from the obvious need to "air condition" the human pilot, crew or passengers, there may be need for serious consideration of temperature conditioning of such equipment as tires.

High temperature rubber substitutes suitable for tires may or may not be developed by the time we want to fly at very high Mach numbers, Schairer warns.

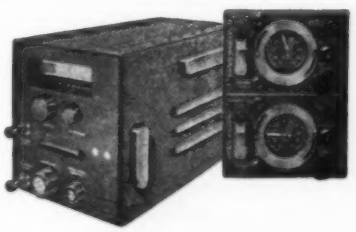
Low Thickness and Aspect Ratios

In high speed aerodynamics, design emphasis will be on features that will permit low drag, ASME was told. This will show up in the very lowest possible wing-thickness ratios with a tendency toward low aspect ratios.

In this respect, the Boeing engineer expects the high-speed airplane is likely to have somewhat poorer lift-drag ratios flying at subsonic speeds compared to present-day types having high aspect ratios. But at high Mach numbers, the low-aspect-ratio and low-thickness-ratio plane will have a better lift-drag ratio than present day designs

automatic dual radar pressurization

Above 50,000 feet, in the rarefied air of the stratosphere, atmospheric pressure is almost nil. But certain components of strategic bombers' navigational and bombing radar need sea-level pressure – others require an even greater pressure. Out of thin air, literally, they get what they need – from the first completely *automatic* pressurizing unit ever developed to provide *two* pressures for airborne radar plenums – Lear-Romec's new automatic dual pressurization kit.

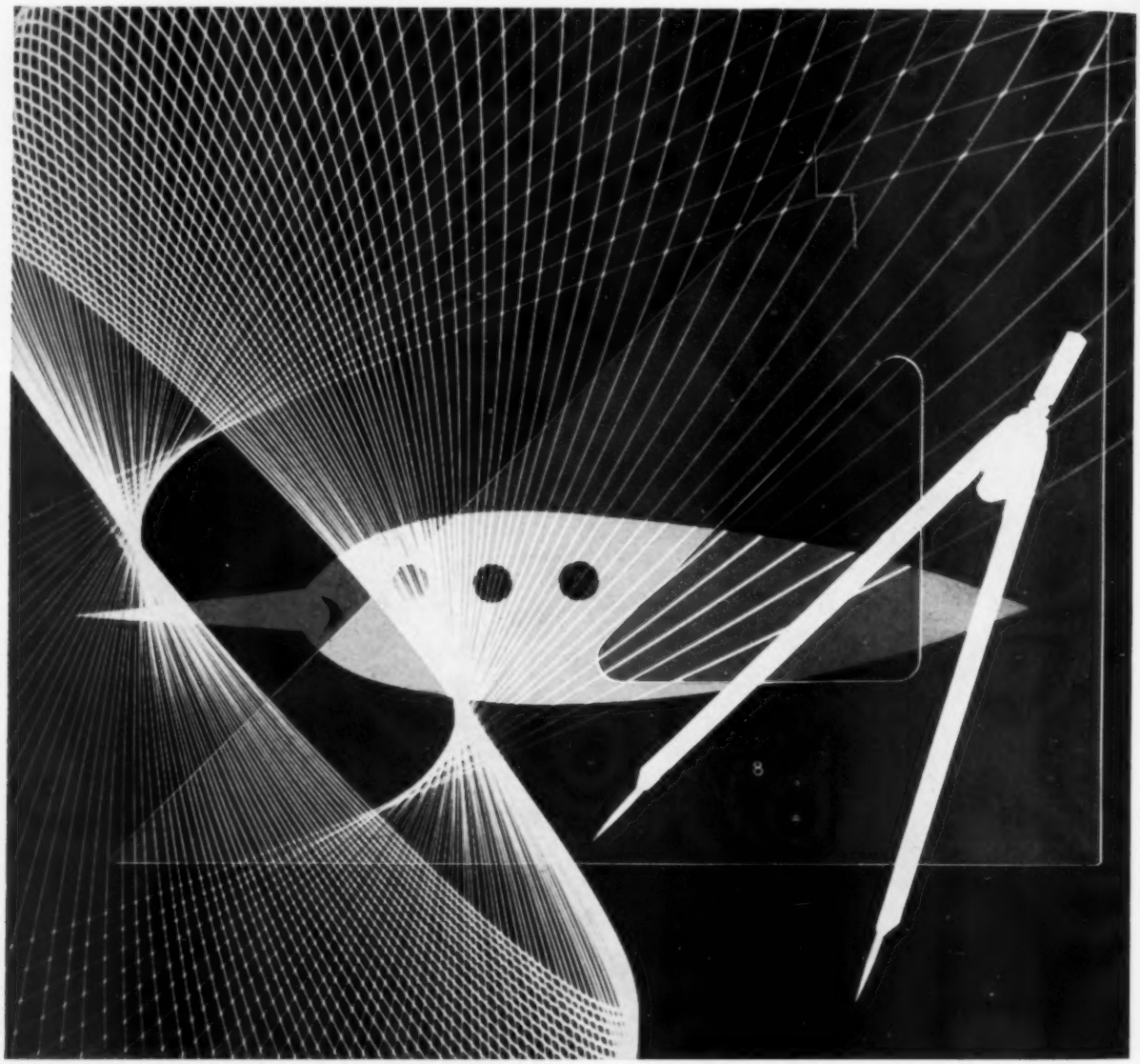


MODEL RR-15020-A (CONTROL PANEL: MODEL RR-15030-A)

LEAR *LEAR-ROMEC DIVISION: ABBE ROAD, ELYRIA, OHIO*

RO-20

Circle No. 9 on Reader Service Card.



Pre-flight tests of AUTONETICS flight control systems are simulated in special analog computers while the planes that will use them are still on the drawing board.

Now man can fly a plane before it's built

For many years there were problems in the design of aircraft which could not be solved practically except by trial and error—a slow, costly, often dangerous method.

Today much of this guesswork and time, as well as some of the hazard, has been eliminated—thanks to newly designed electronic devices. Now specially designed computer systems simulate on the ground actual conditions of supersonic flight...help predict the performance of aircraft which are still on the drawing board.

Although actual flight will always be the final test of any aircraft, these special uses of computer systems by the AUTONETICS Division of North American Aviation are daily helping solve complex problems in less time and with more certainty than ever before ...speeding scientific break-throughs in the whole intricate field of advanced electro-mechanical systems—auto pilots, auto navigators, automatic armament controls, and other automatic control systems.

If you have a professional interest in this field, either as an engineer or manufacturer, please write to AUTONETICS, Dept. A-2, 12214 Lakewood Blvd., Downey, California.

Autonetics

A DIVISION OF NORTH AMERICAN AVIATION, INC.

AUTOMATIC CONTROLS MAN HAS NEVER BUILT BEFORE

by several orders of magnitude.

And the trend toward reduced aspect ratios may call for a new approach to stability—one that could change the shape of future aircraft. It may very well lead to horizontal tail locations in unusual places by today's standards, and in some cases eliminate it altogether, Schairer told the engineering session.

His reason—the "downwash" problem, or bending of the airstream by the wing in flight. This downwash produced by a given angle of attack of the wing increases materially as the aspect ratio is reduced. If the downwash angle is equal to the angle of attack, no variation in tail load with aircraft angle of attack will be experienced and the horizontal tail will no longer help longitudinal stability.

In other ASME developments:

• E. H. Dix, Jr., director of research for Aluminum Co. of America told of a new aluminum alloy (X2219-T6) now in the experimental stage for sheet, plate, extrusions and forgings. It contains 6.0% copper and 0.3% manganese in addition to small quantities of vanadium and zirconium and reportedly has outstanding properties above 500°F.

Above about 600°F, Dix said, new aluminum powder-metallurgy (APM) products have strength superior to any conventionally-produced aluminum alloys. Alcoa is experimentally producing APM compacts up to 21 in. in diameter and weighing 800 pounds. However, large quantities of APM products cannot be made available until production facilities are set up—a step so far not justified by industry demands.

• L. R. Jackson and S. Gordon of Battelle Memorial Institute introduced a new index structural index for evaluating the high-temperature performance of titanium in comparison with other materials. Based on tests with titanium alloys at both Boeing and Convair, they reported excellent results with the use of the new index. ◆◆◆

Wilson Names Murphree Missile 'Czar'

Defense Secretary Charles Wilson's long search for a missile "czar" ended last month with the appointment of Eger V. Murphree, president of Esso Research & Engineering Corp., to the new post.

Murphree, a chemical engineer with no missile background, was slated to take up his duties early this month and to serve for at least a year. He will direct the research, development and production of all missiles except those already adopted for service use. Long-range ballistic missiles will get most of his attention.

Wilson announced Feb. 1 he was looking for a special assistant to coordinate military guided missiles. His statement came in the midst of powerful Democratic criticism of the Administration's ballistic missile program, and followed an appeal by Sen. Henry Jackson (D-Wash.) for appointment of a single civilian administrator for missiles.

• **Asked about** the appointment, Jackson commented: "It's better late than never." He said Murphree "sounds like a good man" and expressed hope he will "take a bold, imaginative approach to this crucial problem."

Murphree, according to Wilson, will have greater missile responsibilities than retiring Chrysler Corp. Chairman K. T. Keller when he coordinated missile development from 1950 to 1953. Though Murphree's staff will number only about five or ten persons, a Pentagon directive defining his duties authorizes him to call on the Assistant Defense Secretaries for staff support. In addition, he will head the OSD Ballistic Missiles Committee.

Eger V. Murphree

"I think he will make a great contribution to the (ballistic missile) program in a year," Wilson said.

• **Murphree, 57,** will serve without compensation under the terms of a statute enacted in 1951 permitting the Pentagon to employ up to 10 persons without requiring them to dispose of their stock, Wilson said.

The new missile czar joined Esso Research and Engineering Co. (then Standard Oil Development Co.) in 1934 as Manager of Development and Research. He was elected vice president in 1937, executive vice president in 1946 and president in 1947. During World War II, Murphree was a member of the Office of Scientific Research and Development S-1 Committee which played a large role in creation of the Manhattan Project. ◆◆◆

Air Force Cuts Order For Republic Fighters

After a review of requirements, the Air Force cut its overall order for the Republic F-84F and RF-84F by about 10%.

Cancellations involve between 250 and 300 of the fighter-bombers and will reduce Republic's backlog by more than $100 million. The reductions involve planes which would have been produced for the USAF and Mutual Defense Assistance Pact nations after March 1957.

Funds resulting from the terminations will probably be used to purchase Century-series planes, including the North American F-100 and F-107 and Republic F-105.

The AF's action also resulted in cancellations of the Wright J65 turbojet which powers the Republic plane, but Roy T. Hurley, Curtiss-Wright's president and chairman, reported negotiations are under way for $35 million worth of jets. This, he added, will more than compensate for the reductions.

Lockheed Orders Four RB 109 Turboprops

Lockheed Aircraft Corp. has ordered four Rolls-Royce RB 109 Tyne turboprops. They will be fitted in the Super Constellation prototype and will be evaluated in connection with the proposal to offer a Tyne-powered version of the Electra with this powerplant. Still in its early development stage, the Tyne is not likely to be available for delivery to Lockheed for several years.

Use of another British turbine in a U.S. transport was discussed late last month in Seattle. A team of engineers from Bristol Aero-Engines Ltd. talked with Boeing on the possbile use of the Bristol Olympus turbojet in the 707 Stratoliner. The Bristol team, led by Dr. E. J. Warlow-Davies, deputy chief engineer, visited Seattle at the invitation of Wellwood E. Beall, senior v.p. of Boeing.

Martin Denver Division Working on ICBM

Air Secretary Donald A. Quarles disclosed the names of the USAF's three ballistic missile projects, simultaneously revealing for the first time officially that Martin's Denver Division is working on an ICBM.

There are two ICBMs, he said, the Convair Atlas and the Martin Titan,

and they will use many common components. Cost of having two configurations instead of one will be only 10% more.

Similarly there will be two IRBM versions, the joint Army-Navy advanced Redstone and the AF-sponsored Douglas Thor. Some of the ICBM components, Quarles reported, are applicable and are being made available to IRBM contractors.

SAC Settles Dispute With Home-Owners

An unusual out-of-court settlement was reached last month between Southwest Airmotive Co. of Dallas and 31 home-owners in Fort Worth who had sought an injunction to halt SAC's J33 jet engine testing for the Air Force at Amon Carter Field, and were asking $600,000 in damages. The settlement, approved by the Federal District Court in Dallas calls for:

• Installation of noise reduction equipment which SAC has contracted for must maintain a maximum level of 108 decibels within 50 feet of the two test cells. The equipment must be installed by July 1.

•SAC may operate its testing operation only during the 12-hour daylight period Monday through Friday and one Saturday a month.

•When further weekend or night testing operations are felt to be needed in an emergency, SAC is to contact a committee representing the homeowners for permission. If the committee refuses permission, SAC may appeal to the court.

•SAC settled the $600,000 claim for $2,500, to be divided among the home-owners for "compensation for any and all damages sustained."

The U.S. Government had interceded in the suit on behalf of SAC seeking to restrain the injunction action on the grounds that SAC is the "only company equipped to handle such overhaul and testing and if interfered with "many military aircraft would be grounded and out of activity" in the U.S. and overseas, "seriously hurting and impeding the Defense effort."

Another highlight of the suit was the presence of Malcolm Harrison, vice president of Braniff Airways, as one of the 31 plaintiffs.

Five State Air Officials Resign; Two Replaced

Five state aeronautics directors have resigned in recent weeks in Arizona, Kentucky, Minnesota, Nebraska and Washington. Two have been replaced, two have been succeeded by temporary appointees and one vacancy is still open. Current status is:

• **Arizona:** Richard Maus has resigned and no successor yet named.

• **Kentucky:** Charles H. Gartrell has been replaced by John Diskin as acting director.

• **Minnesota:** Mitchel Perrizo, Jr. has been succeeded by Bale MacIver as commissioner.

• **Nebraska:** James D. Ramsey has joined the Federal Defense Administration and has been succeeded by S. R. (Steve) Gilbert, state airport engineer, in an acting capacity.

• **Washington:** Charles S. Chester has been succeeded by Robert L. Nuber, formerly assistant director.

ODM Plans $510 Million In Tax Write-Offs

The Office of Defense Mobilization is planning to announce five-year tax write-off certificates for 258 transports costing $510 million, thereby completing the revised goal of 900 airliners eligible for 80% certificates of necessity.

As a result, the Defense Air Transportation Administration is urging a further increase in the goal, with no ceiling on the number of planes involved. Support of the Air Force is being sought.

When ODM hiked the goal from 600 to 900 planes last fall, 42 planes were approved. Included were five DC-7s and four DC-6As for American; seven DC-7cs and two Convair 340s for Braniff; 10 DC-6Bs, five DC-6As and two DC-7s for United; two DC-6Bs and one DC-6A for Northwest, and four Convair 340s for National.

The latest ODM list involves 60 Viscounts for Capital; 35 Electras, nine DC-7s and 12 DC-6Bs for American; 37 Electras, 20 DC-7Bs and 10 L-1049Gs for Eastern; 11 DC-7s for Delta; 10 DC-6Bs and eight DC-7Cs for Northwest; 19 DC-7s and seven DC-6Bs for United, and 12 DC-6Bs for Western.

Services Spend Nearly $2 Billion in 7 Months

For the first seven months of fiscal 1956, the three military services obligated a total of $1,972,491,000 for aircraft for themselves and MDAP nations, retaining an unobligated balance on Jan. 31 for themselves of $10,444,148,000.

Spending for aircraft during the same period came to $4,010,887,000. Unexpended balance for the three services and MDAP of $18,323,026,000.

Between July 1 and Jan. 31 orders for guided missiles totaled $659,550,000, the unobligated missile balance standing at $1,219,286,000.

Missile spending climbed to $608,407,000, while the unexpended balance for "birds" was $2,657,748,000.

F8U-1 Probe Measures Pitch and Yaw

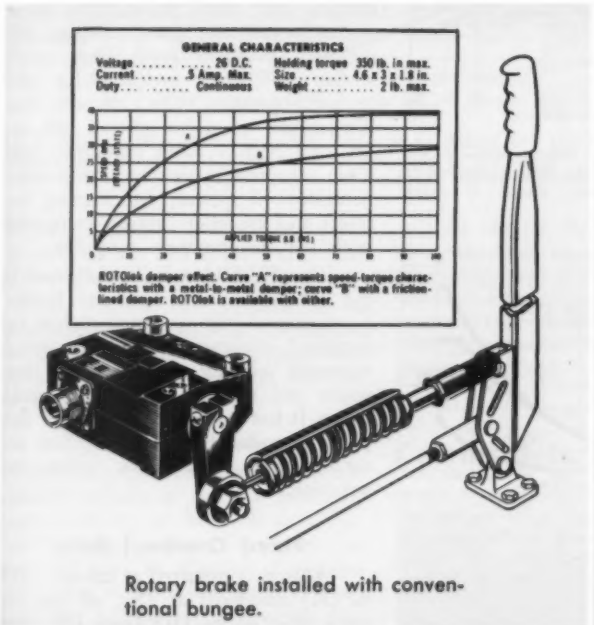
Business end of the Chance Vought F8U-1 Navy supersonic dayfighter looks impressive with its long nose probe above intake for Pratt & Whitney J57 turbojet. Probe has hinged tip for measuring pitch and yaw. Crusader has topped 1,050 mph in level flight.

THE INFORMATION ON THIS PAGE IS TYPICAL OF THE DATA YOU WILL FIND IN THE NEW AIRBORNE CATALOG

BUNGEE CONTROL SYSTEMS

R-460-Rotary
(variable anchor)

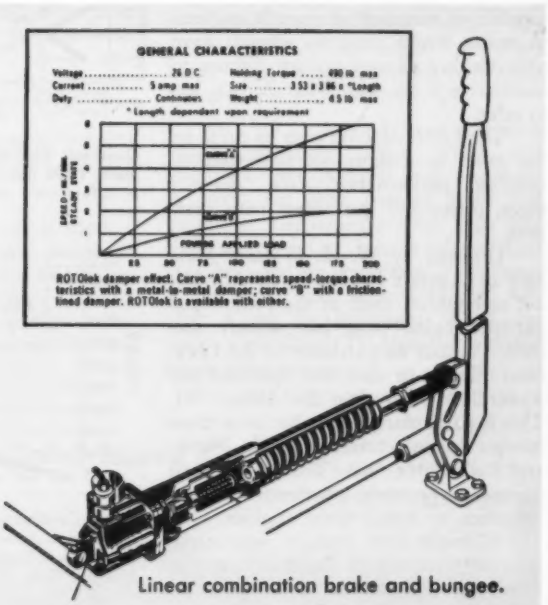
350 in. lb. max. brake holding capacity.


GENERAL CHARACTERISTICS
Voltage ..... 26 D.C.
Current ..... 5 Amp. Max.
Duty ..... Continuous
Holding torque 350 lb. in max.
Size ..... 4.6 x 3 x 1.8 in.
Weight ..... 2 lb. max.
ROTOlok damper effect. Curve "A" represents speed-torque characteristics with a metal-to-metal damper; curve "B" with a friction-lined damper. ROTOlok is available with either.

Rotary brake installed with conventional bungee.

R-590-Linear
(variable link)

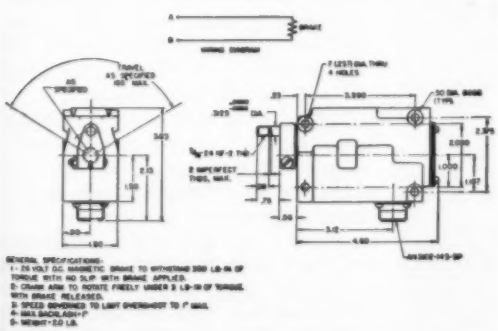
480 lb. max. brake holding capacity.


GENERAL CHARACTERISTICS
Voltage ..... 26 D.C.
Current ..... 5 amp max
Duty ..... Continuous
Holding Torque ..... 480 lb max
Size ..... 3.53 x 3.86 x *Length
Weight ..... 4.5 lb max
* Length dependent upon requirement
ROTOlok damper effect. Curve "A" represents speed-torque characteristics with a metal-to-metal damper; curve "B" with a friction-lined damper. ROTOlok is available with either.

Linear combination brake and bungee.

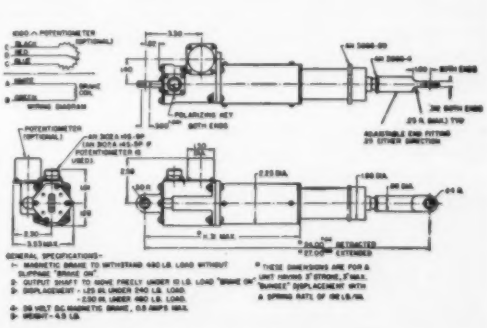
These units are available in other configurations to meet specific torque and steady state speed requirements.

MAGNETIC BRAKE. First designed for control applications in rotary wing aircraft, it has now been applied successfully to fixed wing aircraft. This unit, employed as a variable anchor or link, is most commonly used to cancel out a stick force or for bungee zeroing. In use, the brake is normally on and is energized to release, allowing connected load to "free wheel." These units are available in either rotary or linear configuration and with or without bungee spring.



Special design features are available to meet specific customer requirements:

- Damping—for "dead beat" to eliminate stick kick
- Wide range of torque or force holding
- Specified values of breakout (friction torque or force)
- Specified values of back lash or end play



LINEATOR® • ROTORAC® • TRIM TROL® • ROTORETTE® • ANGLGEAR • ROTOLOK

AIRBORNE
ACCESSORIES CORPORATION
HILLSIDE 5, NEW JERSEY

NEW AIRBORNE CATALOG
Contains full information on the Airborne line of electromechanical actuators and feel systems. Write for your copy today.

Circle No. 10 on Reader Service Card.

Allison Drives for Foreign Commercial Sales

Company's 501 engine leads field as powerplant for Lockheed Electras; closing gap on Rolls-Royce in turboprop competition.

By ANTHONY VANDYK

The Allison Division of General Motors Corp. is now well into a program to establish itself as a worldwide supplier of commercial aircraft engines. In recent weeks company officials have been visiting various foreign airlines to familiarize them with what Allison has to offer.

The GMC division puts its cards on the table in making its presentations, quoting performance data, delivery dates, prices and guarantees with firmness.

Directed by W. O. Watson, Manager of Aircraft Engine Sales, Allison's bid to establish itself in the commercial aircraft engine field has already succeeded in that no purchaser of the Lockheed Electra to date has specified any powerplant other than the Allison 501. This is particularly creditable since three foreign manufacturers—Bristol, Napier and Rolls-Royce—have been doing their utmost to persuade prospective Electra operators to install their engines.

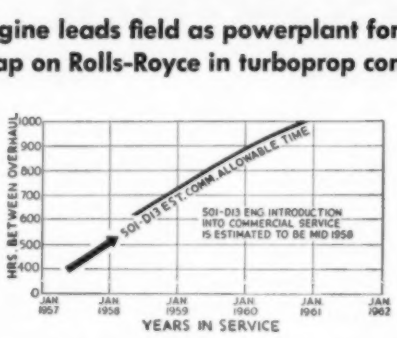
Allison's first foreign commercial sale, 501s for KLM Royal Dutch Airlines' 12 Electras, indicates that the GMC Division has obtained the confidence of foreign airlines, for the Dutch carrier is one of the world's most respected operators.

Plenty of Experience

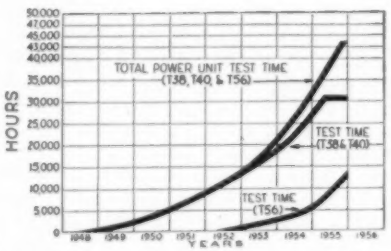
• **What are the reasons** for Allison's initial success? First, perhaps, it is because the entire General Motors organization from president Harlow H. Curtice downward, is solidly behind the commercial aircraft engine policy. Second, it is because Allison has a fine name in the gas turbine field. The division's Indianapolis plants have produced more than 30,000 turbine engines.

The Allison J33 and J35, principally through the Lockheed F-80 and T-33 and the Republic F-84G, have acquired an excellent reputation all over the world. KLM, incidentally, first became acquainted with Allison through the J35, which it overhauls for the Dutch Air Force at its Amsterdam base.

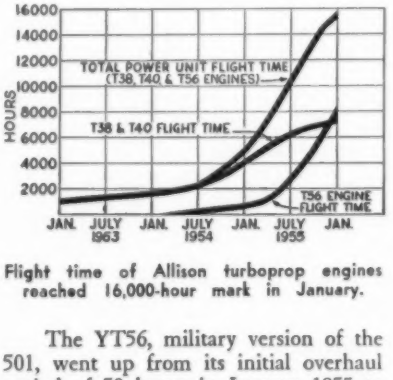
Although it is the most experienced U.S. manufacturer in the turboprop field, Allison is still a long way behind its chief commercial competitor—Rolls-Royce. Nonetheless, it is catching up fast as the accompanying charts show. Very gratifying results were obtained with the recent Military Air Transport Service test program with YT56-powered Convair YC-131Cs.



Overhaul life of the Allison 501-D13 will reach 1,000 hours by late 1960, according to manufacturer's estimates shown in chart.



Total development test hours on Allison turboprops totalled some 44,000 hours at beginning of year. Chart does not include flight time and production test time.



Flight time of Allison turboprop engines reached 16,000-hour mark in January.

The YT56, military version of the 501, went up from its initial overhaul period of 50 hours in January 1955 to 200 hours in August. Total engine removals during 1955 were 46, of which 36 were for time, seven for failures caused by reasons other than malfunction (foreign bodies, mostly), and three for engine malfunction.

The three engine malfunctions were due to the following causes: (1) excessive oil consumption caused by failure of obsolete turbine bearing oil seal; (2) excessive oil consumption caused by coking of turbine oil seal; and (3) excessive vibration caused by alternator drive gear-bearing failure. The average time between engine failures was 2,343 hours.

• **The first commercial engine** that Allison is offering is the 3,750-eshp 501-D13, which is the military T56-A-1 with the following changes: 13.54:1 reduction gear ratio; self-aligning planet system in reduction gear; reduction gear inverted (propeller shaft below power section centerline); provision for autofeather; operation with kerosene fuel; low engine speed for ground idle and taxi; compressor bleed manifold; four-piece compressor housing; low-pressure (outside) oil system; self-cleaning fuel filter; and propeller controls compatible with the Aeroproducts propeller.

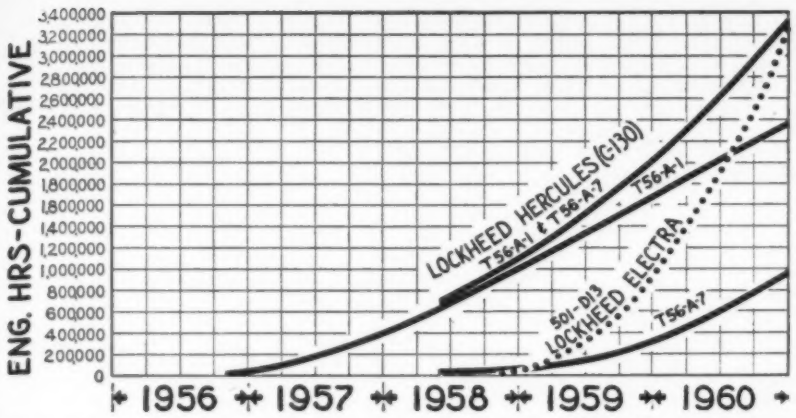
The 501-D13 will be followed by the 4,050-eshp 501-D15, which features a compressor with increased airflow and increased efficiency. It includes use of transonic blading in the first three stages and removal of the inlet guide vanes. It has a turbine with larger flow path, shrouded blades in the first and second stages, and curvic spline construction.

Fixed Overhaul Rate

Allison is prepared to convert D13s to D15 standards at 25% of the purchase price of the D13 (new D13 parts obsoleted by conversion can be returned to Allison). This is one of the many unusual fixed price features which the manufacturer is prepared to write into contracts with airlines. Perhaps the most unusual one is that it will guarantee engine overhaul costs at a fixed rate per engine flight hour. This rate is about $15 an hour, based on a 1000-hr. overhaul life. Allison expects that the 501 will go into commercial operation with an overhaul life of 625 hours.

Because of varying labor costs and other factors abroad this guarantee is offered only to North American operators. However, Allison is prepared to guarantee carriers all over the world that parts cost per engine flight hour will not exceed about $7.50. These prices are good for two-year periods. If the operator does not take the guaranteed cost per flight hour, a warrantee then comes into effect covering 300 hours of operation or one year, whichever is shorter.

• **The price** of the 501-D13 is about $90,000 and this is the cash price F.O.B. Indianapolis. Allison asks no advance payment but also offers no credit arrangements. The company will assist customers in obtaining finance, however. An Allison official put it this way:



This is Allison's forecast of operating hours for its Model 501 (T56) turboprop, including military hours in the C-130 and commercial hours in the Electra. Experimental and pre-production versions of the engine are not included.

"We don't intend to carry any paper but we'll do our best to steer customers to people who can help them."

The division has no plans to set up overseas subsidiaries to sell engines and parts. Most foreign operators have indicated that they prefer to take delivery in the U.S.

Spare Parts Policy

Allison's spare-parts policy permits domestic airlines to carry a minimum spares inventory of 30 to 60 days. Airlines are asked to place firm orders for spares 90 days in advance of requirement. After a spares usage rate is established they are requested to provide Allison with an estimate of spares requirements for each month of a 12-month period. For foreign carriers a slightly longer lead time may be required.

• In common with most engine companies Allison will train free reasonable numbers of flight and ground personnel from customer airlines. Such training will take place in the division's schools in Indianapolis or will be given by instructors sent to the airline's base. Special training aids will be furnished to airlines to assist in training personnel.

Allison's commercial policy is duplicated by Aeroproducts in its efforts to sell its propeller to purchasers of the 501 engine. The General Motors' propeller manufacturer, like the engine division, is relatively new to the commercial field but, under the leadership of C. E. Dixon, Sales Manager, is working hard to establish itself. It offers guaranteed overhaul costs or a warrantee of 1,000 hours or one year (whichever is shorter) for all propeller parts, except the hubs and blades, for which the warrantee life is 10,000 hours.

Training, parts supply and field service facilities offered by Aeroproducts are similar to those included in the Allison program. Both manufacturers, in their bid for the turboprop market, recognize that "on schedule" shipments of spares, plus an adequate factory inventory of both "fast-moving" and "insurance" type parts, are essential to continuing customer satisfaction in the commercial field. ◆ ◆ ◆

William B. Stout, 76, Dies

William Bushnell Stout, 76, died of a heart attack on Mar. 20 at his home in Phoenix, Ariz. Best known as the designer of the Ford Tri-Motor, Stout in recent years had been conducting private research in ornithopters.

Stout designed and built the first internally-braced cantilever airplane in the U.S.; an all-metal torpedo plane for the Navy, and small eight-passenger transports between 1919 and 1925. He developed the Tri-Motor while vice president-general manager of Ford Motor Co., which bought out Stout Metal Airplane Co. in 1925.

In 1926 he formed Stout Air Services, all-passenger airline, which was sold to United Aircraft and Transport in 1929. He then revived Stout Engineering Laboratories and built the all-metal Sky Car private plane. Last year he acted as consultant to a group of engineers that formed Haden Aircraft Corp. in Bellflower, Calif., to build a modified Tri-Motor called the Stout Bushmaster.

Carrier Jets Try Land-based Catapult

Two Douglas carrier-based jets—F4D Skyray interceptor (top) and A3D twin-jet Skywarrior—have been undergoing steam catapult tests at the Naval Air Test Center, Patuxent River, Md., prior to assignment to the USS Forrestal. Both planes are powered by Pratt & Whitney J57 engines. NATC's $5-million XC-7 catapult simulates those used aboard carriers.

First Satellites Won't Have Smooth Sailing

IRE convention gets sober view of Project Vanguard from leading scientists, who warn that missile systems do not always meet expectations.

By HENRY P. STEIER

What the first earth satellites will be and what they will do came in for some sobering evaluation at the Institute of Radio Engineers annual convention in March.

A panel of foremost experts discussed the present status of satellite planning at a symposium on the earth satellite placement program known as project Vanguard, and on the proposed use of electronics to get the most out of the satellites.

W.R.G. Baker, vice president, General Electric Co. and chairman of the symposium, in mentioning the "blue-sky predictions" of the past few months, told the audience they should be concerned not so much with what we'll learn from the first satellites, but that we *do* learn.

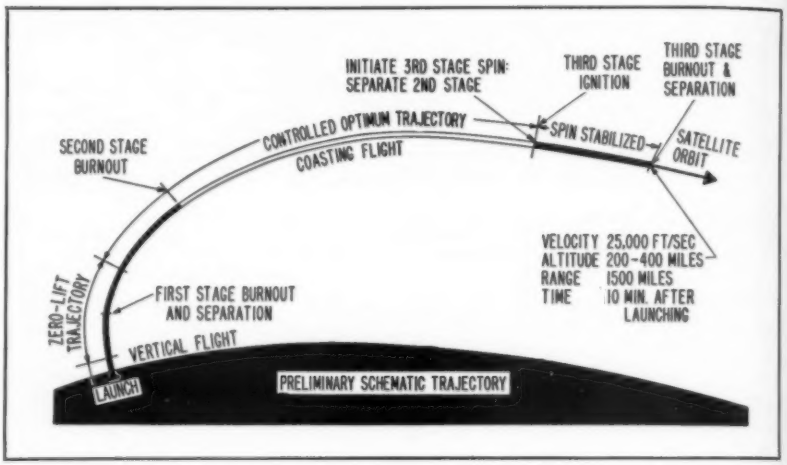
• **Prof. J. A. Van Allen,** Iowa State University, and chairman of the scientific group responsible for internal instrumentation of the satellites, reminded the audience that "missile systems do not always come up to expectations." And, that when it is considered that the satellite payload might be limited to five pounds, "you cannot carry the swimming pools and bathrooms of Dr. Von Braun's space liners."

Planning Revealed

Despite the notes of caution, designed to sober public thinking about the satellites, and warnings that less-than-ideal results might accrue at the first attempts, the scientists revealed some of the exact planning that has evolved since the program was given President Eisenhower's approval on July 29, 1955.

Important objectives of the vehicle program, sponsored by the Department of Defense through the Navy, are to develop the vehicle for placing the satellite and to monitor its performance on the way to the intended orbit. After it gets there, responsibility for tracking the satellites, and collecting and correlating information from it rests with the international scientific organizations taking part in the International Geophysical Year. In the U.S., the National Academy of Sciences and the National Science Foundation are sponsoring U.S. participation in the IGY.

• **Dr. Milton W. Rosen,** Naval Research Laboratory, and technical director responsible for development of the vehicle, said it will be 72 feet long and 45 inches at the greatest diameter, and will have a gross weight of about 11 tons.



Planned trajectory for Vanguard vehicle to be used for establishing first earth satellite in its orbit. First-stage burnout will occur at 36 miles, second-stage burnout at 140 miles. From there coasting flight will occur to the point where the third stage is spun about its longitudinal axis for stability. After that the third stage ignites to "kick" the stage to orbital velocity of 25,000 feet per second. Hoped for orbital height is 300 miles.

Velocity needed for placing the satellite is 25,000 feet a second. As previously reported (AMERICAN AVIATION, January 16, 1956), the rocket will have no fins, and will be divided into three stages.

General Electric Co., as announced, will build the first stage. It will use gasoline, ethyl alcohol and silicone oil as a propellant with liquid oxygen as the oxydizing agent. Aerojet General Corp., subsidiary of General Tire and Rubber Corp., will design the second stage.

The second stage will be propelled by hydrazine using nitric acid for the oxydizer. Both first and second stages will have gimbal-mounted motors moved by electro-hydraulic controls for vehicle orientation. The third stage propellant has not been chosen.

There will be three periods of flight. Taking off vertically, first stage power will take the vehicle to 36 miles. Then, when the vehicle is at an angle of 45 degrees, the first stage will be separated and the second stage ignited. Power will carry the remaining two stages to about 140 miles after which it will coast to the orbital height. This, the planners hope, will be 300 miles.

• **"Brain" of** the entire system will be in the second stage. It will contain all sensing elements for guidance. Dr. Rosen said it will contain a three-gyro reference system, pitch programmer, and air and velocity sensors. During the coasting period, the guidance system will orient the two stages to a horizontal position.

Early in powered flight after second stage ignition occurs, the nose cone will be jettisoned. This part, designed to protect the payload from aerodynamic heating, will no longer be necessary after the most dense part of the atmosphere is passed. Dropping it will aid velocity gain through weight reduction.

During the coasting period, and before the last stage is ignited, a spinning motion will be imparted to the third stage along its longitudinal axis. This will be done to aid stability as is done in ballistic projectiles.

There Will Be Errors

• **Although** the planned orbit is 300 miles, Dr. John P. Hagen, Naval Research Laboratory, who is responsible for directing the launching, said errors in launching and guidance will result in an elliptical orbit around the earth. These errors, he said, might result in an orbit that will bring the satellite to as close as 150 miles at one point and as far away as 1,500 miles at another.

(*Continued on page* 43)

Circle No. 12 on Reader Service Card

Bendix AVIATION Radio

Bendix AVIATION CORPORATION

FOR COMPLETE AVIATION RADIO & RADAR SYSTEMS

. . . LOOK TO THE LEADER

Bendix

. . . REG. U. S. PATENT OFFICE

ANA-18A VHF ANTENNA **Streamlined design reduces drag to minimum for high speed aircraft. Has pressure sealing gasket and hermetically sealed coaxial fitting for pressurized aircraft. Covers 118.0 to 135.95 mc. range.**

MS-192C VHF NAVIGATION ANTENNA **Aerodynamically streamlined for minimum drag. This horizontally polarized, broadband, non-directional antenna is designed for reception of all VHF navigation and localizer signals.**

MN-97H OMNI-MAG **Visual reception of VOR, ILS and relative magnetic heading information in a single instrument. Optional features include standard or expanded range movement (vertical bar), matte white or radium lettering.**

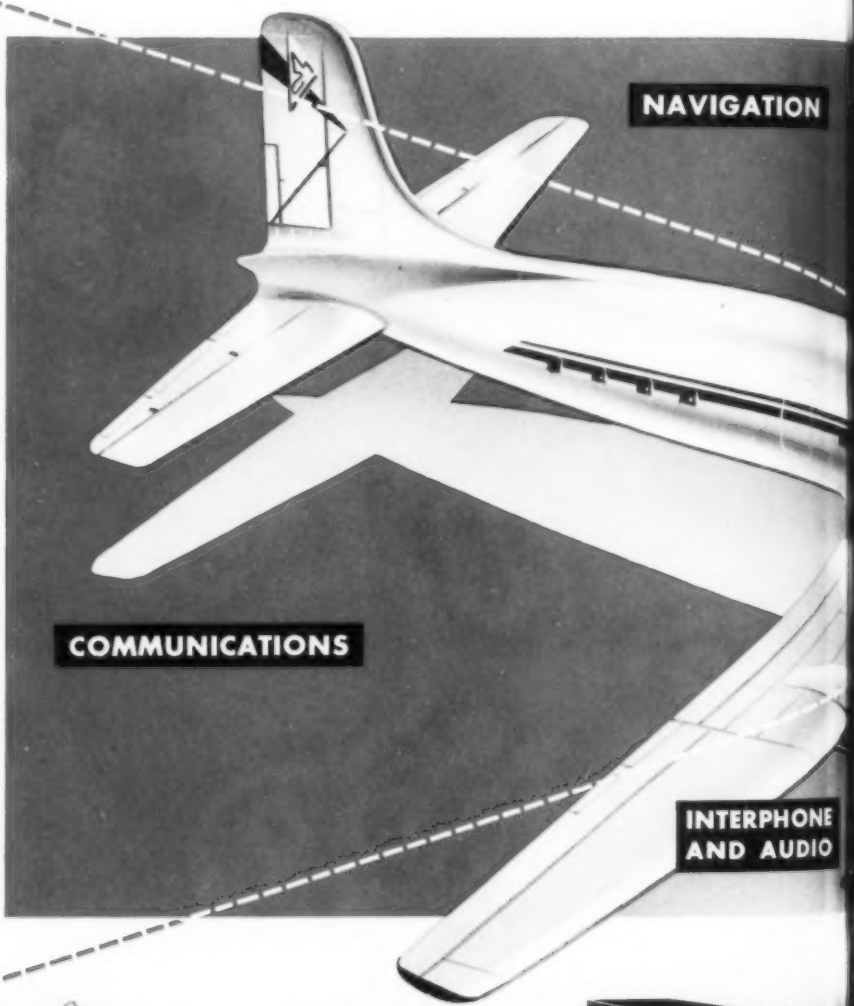
MN-85F VHF NAVIGATION RECEIVER **Provides visual and aural reception of all VHF navigation aids including localizer. 280 crystal controlled channels, spaced 100 kilocycles apart from 108.0 to 135.95 mc.**

TA-20A VHF COMMUNICATIONS TRANSMITTER **360 crystal controlled channels from 118.0 to 135.95 mc. 50-kilocycle channel spacing. Provides 30 watts of r-f output power. Built-in meter and switch permits checking currents in six major circuits.**

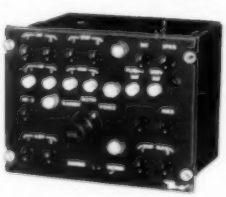
RA-18C-1 VHF COMMUNICATIONS RECEIVER **Provides 360 crystal controlled channels from 118.0 to 135.95 mc. 50-kilocycle channel spacing. 3-microvolt sensitivity. Carrier operated squelch control.**

SLA-18( ) CONTROL PANEL **Selects VHF transmitter and receiver channels simultaneously. Concentric knob volume control optional. Uses Bendix DA-NITE system of illumination providing white numerals during the day and red lighted numerals at night.**

SCL-3A SELECTIVE CALLING UNIT **Eliminates use of headphones and gives simultaneous monitoring of ATC and company channels. Flashing light alerts pilot to call from ground even when monitoring another channel.**



MI-51A AMSPEAKER **Compact cockpit loudspeaker system. Contains amplifier, power supply and loudspeaker in single unit. Can replace or supplement use of headphones. Provides 4 watts audio output.**



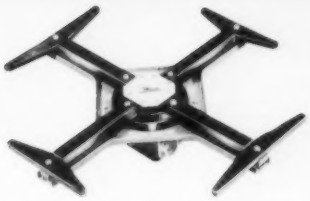
CNA-2C TRANSISTORIZED AUDIO CONTROL PANEL **For eleven receiver, three interphone and four transmitter selectors. Range filters are incorporated for ADF signals. Designed to customer specifications.**

MI-36 ( ) PASSENGER ADDRESS AMPLIFIER **For paging, announcing and entertainment use. Available for use with either dynamic or carbon microphones.**

MN-100A GLIDE SLOPE RECEIVER 20 crystal controlled channels from 329.3 to 335.0 mc. for reception of tone-modulated 90/150 cps. glide slope information. Control panel may be wired for simultaneous frequency selection of localizer and Glide Slope.

MKA-7A MARKER RECEIVER New ¼ ATR, 75 mc. marker receiver weighs only 8.5 pounds with power supply. Improved circuitry greatly reduces possibility of FM or TV interference. Designed for reception of airways and ILS approach markers.

MN-72F RADIO MAGNETIC INDICATOR Dual azimuth indicator provides simultaneous indication of two "heading sensitive" bearings. Used with dual VHF navigation receivers or dual ADF receivers . . . or one of each.



LPA-70A FLUSH LOOP ANTENNA New magnetic type flush mounting antenna designed for use with either old or new ADF systems. Zero drag. Covers frequency range from 90 to 1750 kilocycles.

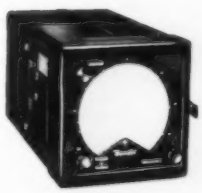
DFA-70A ADF RECEIVER New ½ ATR automatic direction finder. Features precision, electrical servo tuning system . . . no tach shafts. Covers 90 to 1750 kilocycle range in six bands.

CNA-70A CONTROL PANEL Complete remote control of *DFA-70 Automatic Direction Finding System*. Easy-to-operate controls with finger-tip frequency selection. DA-NITE illumination has white and red dial numerals. Meets RTCA specifications.

ANT-1 ( ) ANTENNA 22" and 30" X-band or C-band nose mounted weather radar antenna for airline and executive aircraft. X-band includes cosecant squared pattern.

SYN-1B SYNCHRONIZER-AMPLIFIER-POWER SUPPLY New ½ ATR synchronizer for airborne weather radar system weighs only 21 lbs. Silicon diodes and improved circuitry has reduced size and weight 50% +. Considerable reduction in power requirements.

PPI-1 ( ) INDICATOR Provides 0-20, 0-50, and 0-150 mile range displays. Features off-center display (magnetic de-centering) for better interpretation of storm areas on flight path.



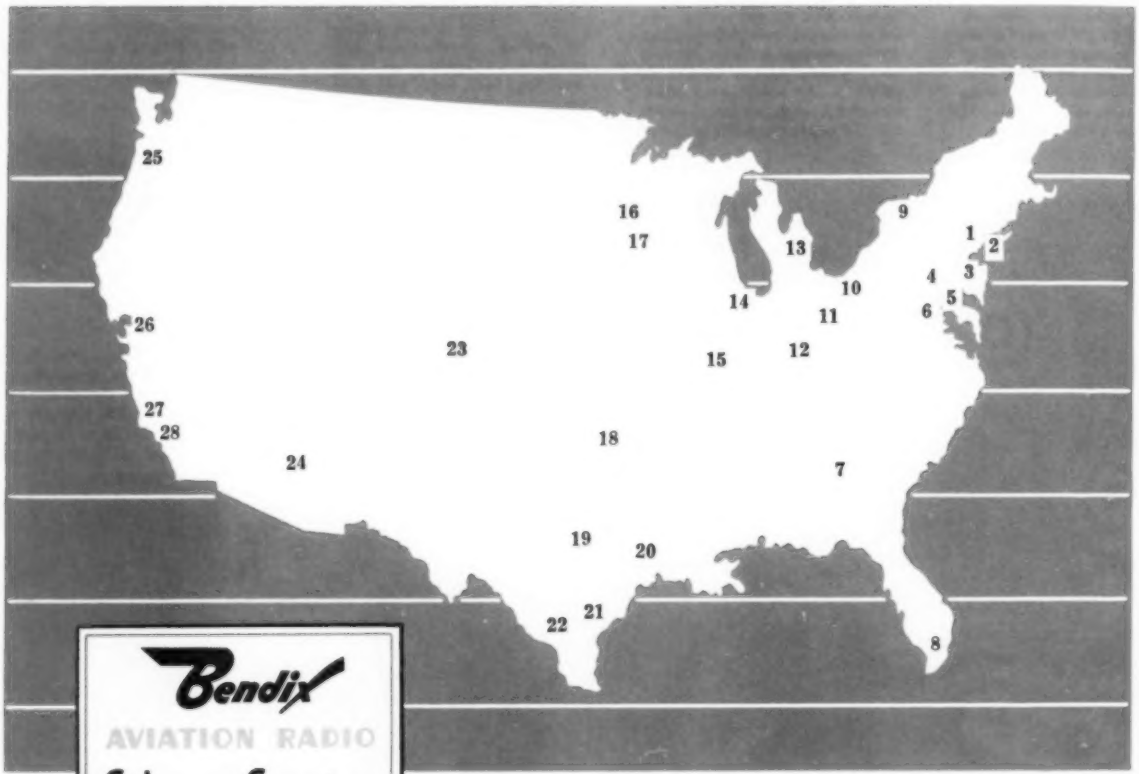
RDR-1 ( ) TRANSMITTER-RECEIVER Bendix *RDR-1 AIRBORNE RADAR SYSTEMS* are available with either X-band or C-band transmitter-receivers. Terrain mapping facilities are provided with either system and RACON beacon operation is available on all X-band units.

CON-1D CONTROL UNIT For remote control of RDR-1 AIRBORNE RADAR SYSTEM (except for controls located on indicator face). Incorporates Bendix DA-NITE system of illumination.

Bendix AVIATION Radio

Bendix AVIATION CORPORATION

COAST-TO-COAST
SALES AND SERVICE



1. **SMITH-MEEKER ENGINEERING CO.**
   157 Chambers Street, N. Y., N. Y.
   Teterboro Airport, Teterboro, N. J.
   Westchester County Airport
   White Plains, New York
2. **AIRMAR RADIO SERVICE, INC.**
   MacArthur Airport
   Ronkonkoma, Long Island, N. Y.
3. **ATLANTIC AVIATION CORP.**
   Teterboro Air Terminal
   Teterboro, New Jersey
4. **READING AVIATION SERVICE, INC.**
   Municipal Airport, Box 1201
   Reading, Pennsylvania
5. **ATLANTIC AVIATION SERVICE**
   New Castle County Airport
   Wilmington, Delaware
6. **APPLIED ELECTRO MECHANICS**
   (Butler Aviation)
   Hangar 9, Wash. Nat. Airport
   Washington 1, D. C.
7. **SOUTHEASTERN AREA**
   For information call
   Bendix Radio, Balto. 4, Md.
8. **L. B. SMITH AIRCRAFT CORPORATION**
   Box 456, International Airport
   Miami, Florida
9. **PAGE AIRWAYS, INC.**
   Rochester Municipal Airport
   Rochester, New York
   Allegheny County Airport
   Dravosburg, Pa.
10. **CHAMBERLAIN AVIATION, INC.**
    Municipal Airport
    Akron, Ohio
11. **OHIO AVIATION CO.**
    P. O. Box 305
    Vandalia, Ohio
12. **AIRCRAFT RADIO LABORATORY**
    Bowman Field
    Louisville, Kentucky
13. **ANDERSON AIRCRAFT RADIO**
    Detroit City Airport
    Detroit 5, Michigan
14. **SKYMOTIVE, INC.**
    O'Hare Field, Chicago Int'l Airport
    Park Ridge, Illinois
15. **REMMERT WERNER, INC. (NAVCO)**
    Lambert Field
    St. Louis, Missouri
16. **MINNESOTA AIRMOTIVE, INC.**
    Wold Chamberlain Field
    Minneapolis 23, Minnesota
17. **GOPHER AVIATION**
    Lobb Field
    Rochester, Minnesota
18. **TULSAIR DISTRIBUTORS, INC.**
    Hangar 8, Municipal Airport
    Tulsa, Oklahoma
19. **DALLAS AERO SERVICE**
    3300 Love Field Drive
    Dallas 9, Texas
20. **SUPERIOR RADIO CO.**
    P. O. Box 1258
    Shreveport, Louisiana
21. **FAULKNER AIR RADIO**
    8222 Travelair
    Municipal Airport
    Houston, Texas
22. **HOWARD AERO SERVICE, INC.**
    International Airport
    San Antonio, Texas
23. **AIRCRAFT RADIO & ACCESSORY**
    Hangar 4, Stapleton Field
    Denver, Colorado
24. **AERO ELECTRONICS, INC.**
    Maricopa County
    Phoenix, Arizona
25. **KARPURK ELECTRONIC SERVICE**
    6000 N.E. Marine Drive
    Portland 13, Oregon
26. **BAYAIRE AVIONICS, INC.**
    Oakland Airport
    Oakland, California
27. **QUALITRON, INC.**
    Lockheed Air Terminal
    Burbank, California
28. **AIRESEARCH AVIATION SERVICE**
    5907 Imperial Highway
    Los Angeles, California

* **ANCHORAGE AIRBORNE RADIO AND ELECTRONICS, INC.**
Box 928 Lake Hood
CMA International Airport
Anchorage, Alaska

BENDIX RADIO • DIVISION OF BENDIX AVIATION CORPORATION • BALTIMORE 4, MARYLAND

West Coast Sales: 10500 Magnolia Blvd., N. Hollywood, Calif.
Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N.Y., U.S.A.
Canadian Distributor: Aviation Electric, Ltd., 200 Laurentian Blvd., Montreal, Quebec

(*Continued from page 38*)

The orbital angle with reference to the equator is hoped to be 30 to 45 degrees. According to Dr. Hagen, this position was selected because observation can then be made at all times in temperate latitudes "where the density of scientific population is high."

Radio telemetering will play a challenging role, and will be employed to monitor the second and third stage performance during the mission. According to Dr. D. G. Mazur, Naval Research Laboratory, who is responsible for the telemetering planning, only transmission of the "barest essential information" will be attempted at "the advent of the first satellite."

Problems Noted

• **The techniques** for telemetering vehicle data will include time and frequency division systems. It is agreed the ionosphere may present a serious problem in transmission, and that background electrical noise will be severe. Decreased bandwidth and increased ground antenna gain will be used as partial solutions to those problems.

Antennas will be a serious problem on the vehicle because of aerodynamic heating and the need for an omni-directional system. Tests on Vanguard radio systems are already under way at the long-range missile test range that originates at Cape Canaveral in Florida.

Tracking the earth satellite and data transmission from it are the big problems in final realization of the satellites' utility. The important factor in these problems is to tie the two together, so that the satellite's position at the time it is taking measurements becomes most important.

• **According to Baker,** instrumented rockets will be fired from the ground and from aircraft during the IGY, but the important difference between these and the satellites is the value of synoptic, or long-term, observations possible only with the satellites. This is where their foremost value lies.

Both optical and radio methods will be used for tracking and data transmission. To supplement weather-dependent optical methods a radio system known as "Minitrack" is under developed by NRL for carriage in the satellite. According to Dr. J. T. Mengel, NRL, "Minitrack" will be used for tracking the satellite and to obtain scientific data from it.

He said tracking the satellite will be comparable to trying to find and follow a golf ball thrown out of a jet plane traveling at Mach 1 at 60,000 feet. Planning for the tracking function calls for a tiny radio oscillator developing 10 to 15 milliwatts power. Total weight of the whole radio system may be two to three pounds. The oscillator itself will weigh about 15 ounces with batteries. Batteries may be of the silver-zinc type, such as those made by Yardney Electric Co., according to Dr. Mengel. Whether the two- or three-pound figure is met seems to hinge upon reliability.

Radio Amateurs to Help

A simplified version of the Minitrack system will be made available to radio amateurs. They will be urged to establish stations and to record data received from the satellites. These data will then be correlated with other scientific data. Transmission is expected to be in the 108-megacycle region of the spectrum.

Transistors Being Studied

• **Reliability** of each component to be used is receiving most exact attention. A drawback to use of transistors that would result in a two-pound radio weight is the "unknown quantity" in transistor reliability—their newness and lack of statistical data about them.

The tracking problem will be solved with the help of receiving stations on the ground. By means of a radio-phase comparison technique using the parameters of path length to different signal sources, and the phase of the arriving signal, the ground stations will receive data and feed them to a computer center that will calculate information on the immediate satellite position.

Traveling through the orbit, "Minitrack" will also send data to the ground from scientific instrumentation on-board the satellite. Plans are being made for a two-week's power supply life. Tracking and data systems will each operate for 30 seconds at a time. A ground command station will instruct "Minitrack" to turn on as the satellite approaches the area served by a ground station.

The different satellites, according to present indications, will be used for collecting different data. What will be measured first or through the whole program by satellites is yet undetermined, according to Prof. Van Allen. The group on internal instrumentation of the satellites, for which he is chairman, have been "sifting proposals" on what should be measured. To do the sifting these criteria have been set-up:

- Scientific importance.
- Feasibility.
- Competence of groups involved in doing work.
- Importance of the vehicle to proposed work—balloon, rocket or satellite? Based on these criteria, a priority list has been established after the first go-around on proposals made thus far.

Van Allen stressed the fact that for every one pound reduction in payload 80 feet per second in final velocity is gained. For this reason, he said, the maximum payload might be 21 pounds or 0 pounds. In any event the satellites would be useful. He said people should "not think the satellites will be spherical, weigh 21 pounds, have identical payloads or any payload at all." ◆◆◆

Life and Types of Satellites

How long the satellites will stay in their orbits is related to their altitudes. According to Dr. John P. Hagen, the following lifetimes apply for different orbits—assuming the orbits are circular and not elliptical:

- 350-mile orbit—1-year lifetime.
- 200-mile orbit—15-day lifetime.
- 100-mile orbit—less than 1 hour.

The type of satellite may vary with each launching. According to Prof. J. A. Van Allen, three types of configuration are under consideration:

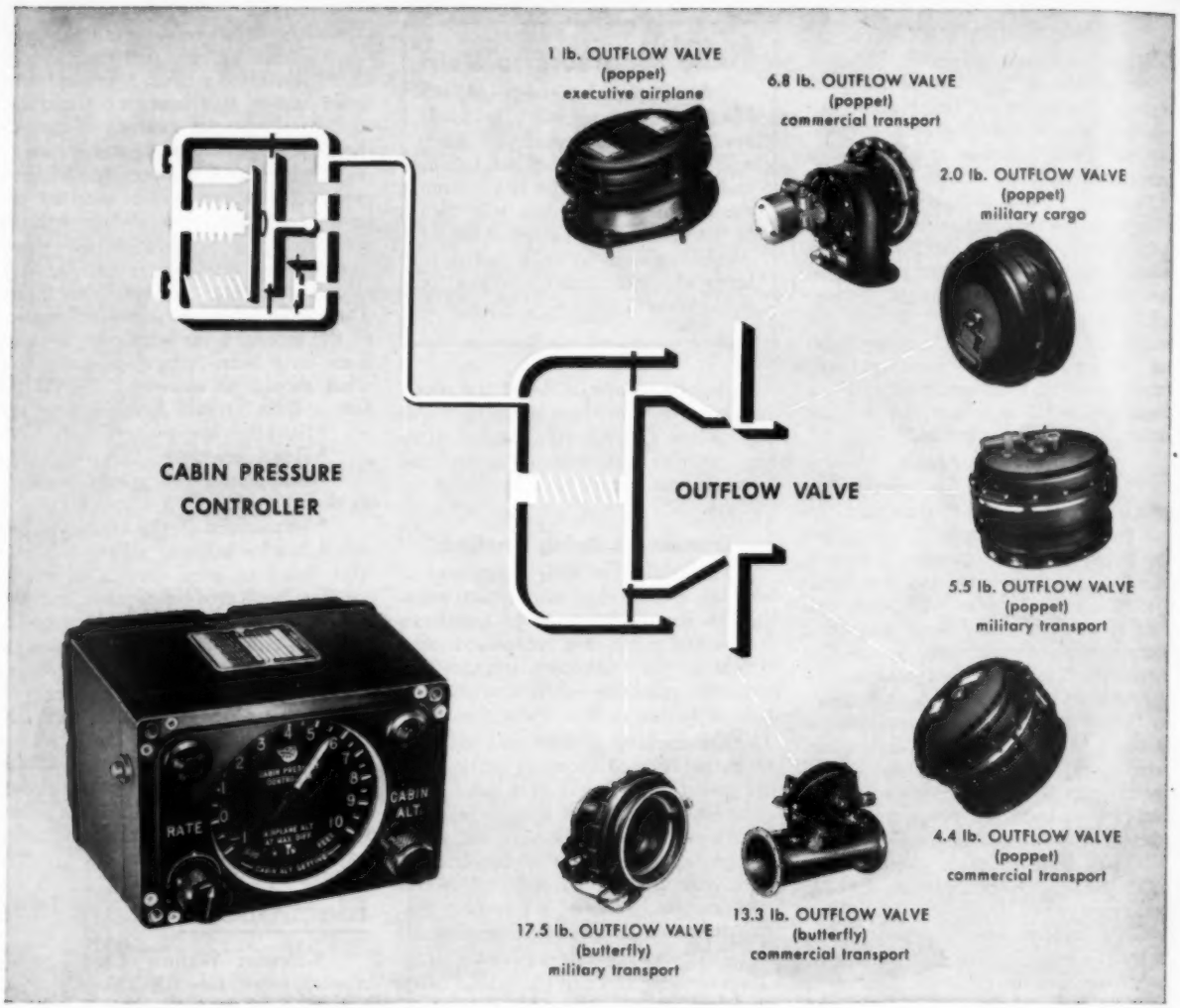
- 20-inch diameter with a nominal payload.
- Compact payload left attached to the third stage.
- Large expandable sphere containing nothing but having high optical visibility.

Electronotes

• **Stewart-Warner Corp.,** which manufactures the ARC-27 Air Force communications transceiver, points out that it had to develop a new approach to transferring the ARC-27 chassis to its case. Just lifting the chassis into the case caused misalignment of the UHF equipment which has over 1,000 channels.

• **The Central Propagation Laboratory** of the National Bureau of Standards, which is doing the study of propagation factors affecting the expected coverage of Tacan facilities on a country-wide basis, reports a collection of 4,500,000 punched cards containing weather data to permit study of the effects of meteorological conditions on radio transmission. The laboratory operates equipment in the plains, foothills and mountainous regions of Colorado for its studies.

• **Radio-Electronics-Television Manufacturers Association** has announced a new publication, *The Summary of Registered Crystal Diodes.* The summary was prepared by RETMA's engineering department from registered specifications supplied to the Joint Electron Tube Engineering Council by the manufacturer of each crystal type. The publication is available from RETMA at $1 a copy.



Two unit pressure control

FOR ALL SIZES OF AIRCRAFT CABINS

Simple, proved AiResearch pneumatic system operates independently...requires no outside power

The two elements of the complete AiResearch cabin pressure control system are a pneumatic controller and an associated outflow valve.

Only calibration is required to adapt the controller to various aircraft cabin pressure requirements. Minimum or no servicing is needed.

The outflow valve is a simple diaphragm and spring operated valve connected to the controller by a pneumatic line. It may also serve as a safety valve under emergency conditions.

An electrical or pneumatic override can be provided to give the pilot manual control whenever conditions warrant it.

This system is immediately available for all aircraft models. Your inquiry is invited.

Qualified engineers are needed now for unexcelled career opportunities. Write for information.

THE GARRETT CORPORATION

AiResearch Manufacturing Divisions

Los Angeles 45, California • Phoenix, Arizona

Designers and manufacturers of aircraft systems and components: REFRIGERATION SYSTEMS • PNEUMATIC VALVES AND CONTROLS • TEMPERATURE CONTROLS • CABIN AIR COMPRESSORS • TURBINE MOTORS • GAS TURBINE ENGINES • CABIN PRESSURE CONTROLS • HEAT TRANSFER EQUIPMENT • ELECTRO-MECHANICAL EQUIPMENT • ELECTRONIC COMPUTERS AND CONTROLS

New Products and Processes

DUAL CONTROL PANEL & PRESSURIZING KIT

Lear-Romec Division, Lear, Inc. has developed a pressurizing kit for maintaining dual pressures in airborne radar equipment and a control panel for use in conjunction with the kit.

Model RR-15020-A kit operating at low pressures produces 50 cipm (.0002 lb. per minute) free air delivery at 32 in. Hg absolute discharge pressure with inlet equal to 60,000 ft. ambient. At high pressures it produces 30 cipm (.0013 lb. per minute) free air delivery at 50 in. Hg, with inlet equal to 60,000 ft. ambient.

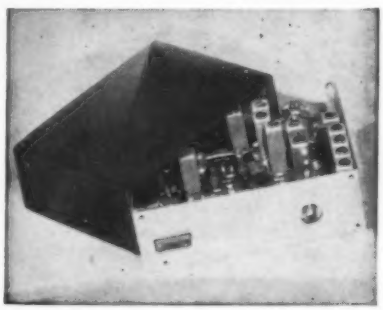
The control panel consists of air pressure gauges, electrical switches and two panels, one for high-pressure systems and the other for low-pressure systems. The toggle switches override the pressure switches in the pressurizing unit so that the radar system can be checked on the ground for leakage.

The pressure, whether high or low, is read on the gauges, and the drop or rise in pressure is timed to make certain that the leakage is not excessive.

Instruments are illuminated by indirect light. Literature is available.

Circle No. 160 on Reader Service Card.

MARKER-BEACON RECEIVER



Radio Corp. of America plans to start production this year of an all-transistor electronic marker-beacon receiver for commercial and military aircraft, weighing only 15 oz.

Said to be the smallest and lightest such receiver yet developed, it operates on ¾ watt and measures 2 x 4 x 5 in. RCA has also designed a three-light signal box of the same dimensions to provide a compact 30-ounce beacon system.

Circle No. 163 on Reader Service Card.

SHUT-OFF VALVE

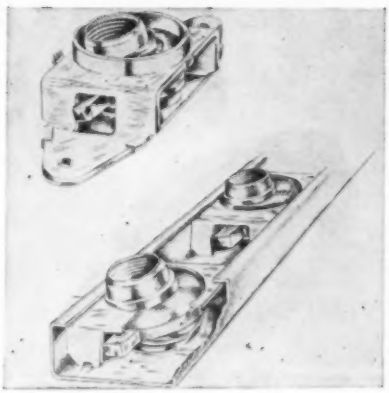
A dc solenoid-operated pneumatic shut-off valve, Model 21A, designed for aircraft, weapon, missile or industrial pneumatic systems, is being manufactured by **National Aircraft Corp.**

The valves are available in normally open or closed versions, with or without manual override. Principal features are the fact that they are statically balanced and have sealing members of stainless steel and teflon. Some are of media nylon. Other features: pressure ranges to 3,000 psi; temperature range, —65° to 275°F; current drain, 1.5 amps. max. at 30 volts dc; voltage range, 18 to 30 dc continuous duty.

A family of two-way, three-way, four-way and special configuration valves is available. All are suitable for use with air, nitrogen and most other gases.

Circle No. 159 on Reader Service Card.

SELF-ALIGNING LOCKNUTS



A new line of anchor and gang-channel self-aligning locknuts has been designed by **Elastic Stop Nut Corp.** of America for bolting attachments to large forgings in aircraft where misalignment of surfaces presents a fastening problem.

These fasteners can be installed without machining, milling or other preparation of forgings presently used to obtain the required parallel surfaces for normal bolting.

Based on a variation of the ball-joint principle, the locknuts have a tilt range of 8° from centerline at any point for accommodating misalignment of surfaces to be fastened.

Circle No. 166 on Reader Service Card.

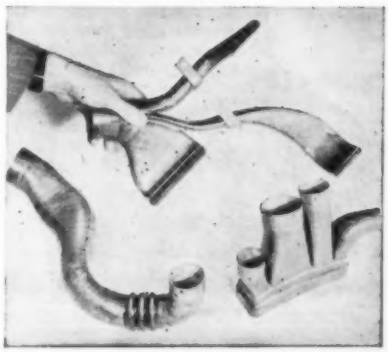
NAVIGATION COMPUTER

A circular slide rule designed to solve such problems as true airspeed, Mach number, time and distance, ground speed, fuel consumption, density altitude, true altitude, relative wind, wind components, drift angle, etc., has been developed by Aeronautical Services, Inc.

The ASI computer has a diameter of 4½ in., comes in a handy pocket case. It is designed for use by pilots, navigators and flight engineers, eliminating the need for pencil or straight-edge.

Circle No. 161 on Reader Service Card.

JET AIRCRAFT DUCTING



Narmco Manufacturing Co. is fabricating high-temperature jet aircraft ducting of lightweight, reinforced fiberglas that weighs much less (up to 48%) than conventional metal ducting of equal strength.

The company uses "Conolon" Fiberglas laminates for its ducting. Wall thickness of a single duct may range from two to more than five plies of reinforced Fiberglas to accommodate varying degrees of stress concentration encountered in a complex ducting system.

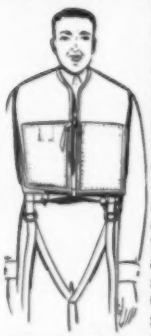
Advantages of using this material are said to include resistance to corrosion, heat and dents, ease of attachment to other elements of the aircraft ducting system, flexibility and easy of fabrication of expandable bellows sections. Literature is available.

Circle No. 157 on Reader Service Card.

ANCHOR NUTS

A new series of corrosion-resistant anchor nuts suitable for use at temperatures ranging to 900°F, according to the manufacturer, has been introduced by **The Kaynar Co.** They meet the 800° requirement of Air Force-Navy Specification, MIL-N-25027.

The Kaynar anchor nuts are available in both miniature and regular size.



Where human life is at stake there cannot be any compromise in the quality of survival equipment. We therefore take pleasure in presenting, for your inspection, the finest life-survival jacket available today. This is the jacket recognized and purchased by the U.S. Air Force. It is quick and easy to don and is light and virtually bulk-free prior to inflation. Two chambers are instantly CO_2 inflated by simply jerking the pull-cords. (Plus the added protection of simple oral inflation.) Precision design holds the body in an upright position keeping the face above water even if the wearer is unconscious. A jacket pocket includes a dye marker and signal whistle.

Model #B-5 individually priced at **$19.10**

To order or for further information, write:

WILLIS & GEIGER, INC., Dept. [redacted]
5 East 37th Street, New York 16, N. Y.

Circle No. 14 on Reader Service Card.

WHAT IS "THE FIRST ORDER OF BUSINESS" *every day?*

Many must items in the day's business are set aside when the American Aviation DAILY arrives on the desk of a key executive in the industry. That's because the DAILY is first reading for aviation's leaders, ever since it began in 1939. The DAILY offers these leaders, and all others interested in aviation, up-to-the-moment information about every important event taking place AS IT HAPPENS.

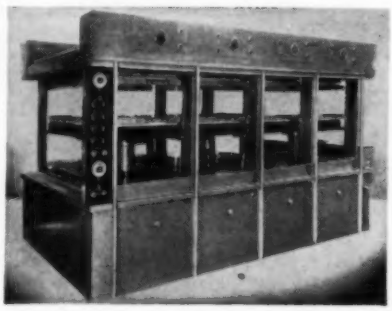
For a sample copy, forward your request to Dept. B, American Aviation DAILY, (An American Aviation Publication) 1025 Vermont Avenue, N.W., Washington 5, D. C.

NEW PRODUCTS

They are said to be especially suitable for use in electronic devices, aircraft equipment and wherever low magnetic permeability fasteners are required.

Circle No. 164 on Reader Service Card.

MOLDING PRESS



Pasadena Hydraulics, Inc. has developed a new press, designated the PHI Multi-Press, to meet the requirements of aircraft manufacturers in molding and forming honeycomb.

Molding area of the press is 54 by 110 in. A total pressure of 560 tons is obtained by eight 70-ton rams pressing in unison on separate 24½-in.-sq. platens. Each platen has cast-in calrod heaters with individual temperature controls to 600°F.

A central control panel coordinates all or any two grouping of rams.

Circle No. 165 on Reader Service Card.

TRANSISTORIZED POWER SUPPLY

Two classes of transistorized regulated power supplies have been announced by **Electronic Research Associates, Inc.**

One class is of the fixed-voltage type designed to be wired into circuits to provide dc power for guided missiles, computer units, etc. Voltage ratings from 5 to 300 volts dc at currents to 100 ma are available. Operation is from a 60- to 400-cycle source, Regulation is rated less than 0.5 per cent and ripple less than 0.05 per cent. Size of a 150-volt dc, 100-ma unit is 3⅞ x 3⅞ x 4¾ inches.

The other class is intended for laboratory use, and is available for voltage ranges of 0-50 to 0-300 and with current ranges from 50 to 300 ma. Units are intended for 50- to 60-cycle operation. Regulation is rated better than 0.25 per cent and ripple less than 0.01 per cent.

Circle No. 154 on Reader Service Card.

ENGINE MOUNT

The MB Manufacturing Co., a division of Textron American, Inc. has developed an engine mount, designated MB-5900, that is said to be the lightest, strongest isolation mount designed specifically for the Pratt & Whitney R2800-C engine.

Included in the mount are an aluminum housing and a separate replaceable steel stud. Because the two mount parts are interchangeable, a new stud is not necessary if the housing is damaged.

There are six mounts per engine set. They weigh 20.7 lbs.

Circle No. 150 on Reader Service Card.

AXIAL-FLOW BLOWER

Motoronics Corp., a subsidiary of Gladden Products Corp., has developed an axial-flow blower for aircraft and guided missile applications that measures only 2.2 in. in diameter by 3 in. in length, yet produces 60 cu. ft. of free air per minute.

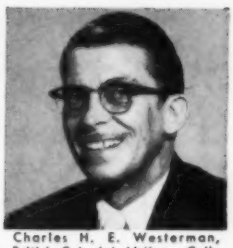
The small over-all size is made possible by employment of miniature

Don Vest, Vest Aircraft & Finance Co., P O. Box 5306, Sky Ranch Airport, Denver, Colorado.

Gene Hudman, Stonnell and Holladay Aircraft Sales, Carolina Division, Municipal Airport, Charlotte, North Carolina.

Peter Graves, Southern Ohio Aviation Sales Co., Dayton Municipal Airport, Vandalia, Ohio.

John Wilsdon, Hunter Aviation Co., P O. Box 122, Lambert Field, St Louis, Missouri.



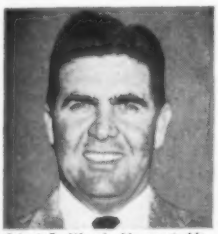
Charles H. E. Westerman, British Colonial Airlines, Calle Lopez No. 1 — Despacho 502 Mexico, (1) D.F., Mexico.

H. Warren Holladay, Stonnell and Holladay, 843 Washington Building, Arlington Towers, Arlington, Virginia.

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.

B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.

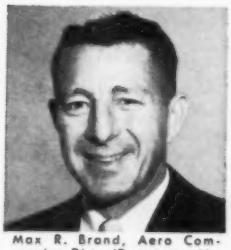


Robert F. Wood, Newport Air Park, Newport, Rhode Island.

A. M. "Sime" Bertolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania.

Ira Hartzog, Aero-Tex Corporation, 3300 Love Field Drive, Dallas, Texas.

J. B. Redwine, Fairfax Aviation, Inc , 3301 Fairfax Trafficway, Fairfax Airport, Kansas City, Kansas.



Max R. Brand, Aero Commander Dist. (Downtown Airpark), Hangar 3, Municipal Airport, Tulsa, Oklahoma.

E. H. "Ted" Talan, National Aero Sales Corp., Midway Airport, Chicago, Illinois.

Dale Rapp, Jr., Aero Southern Corp., 601 Broadway, Nashville, Tennessee.

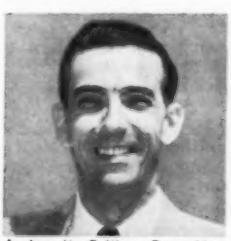
W. H. "Bill" Buchanan, Sales Manager, Johnson Air Interests, Inc., Horlick-Racine Airport, Racine, Wisconsin.

Louis Humphreville, Executive Aircraft Corporation, Municipal Airport, Pontiac, Michigan.

L. S. McIntire, Vest-Livingston Aircraft, Inc., International Terminal Building, International Airport, Oakland, California.

John A. "Jack" Bauman, Santa Monica Aviation, 3011 Airport Avenue, Municipal Airport, Santa Monica, California.

Herrol Bellomy, L. B. Smith Aircraft Corp., Miami International Airport, Miami, Florida.



Lucien M. Taillac, Trans-Aire Corporation, Pan-Air Building, New Orleans Airport, New Orleans, Louisiana.

Joseph H. Frost, Jr.

Robert M. Brown

Commander Sales Company, Terminal Building, International Airport, San Antonio, Texas

NATION-WIDE SALES and SERVICE

AERO DESIGN Commander

AERO DESIGN AND ENGINEERING COMPANY

TULAKES AIRPORT • OKLAHOMA CITY, OKLAHOMA

This is it!

FOR JET POWER MEASUREMENT WITH UNRIVALED ACCURACY SPECIFY NORDEN-KETAY PRESSURE RATIO INDICATING SYSTEMS

Combining maximum reliability with light weight design... Norden-Ketay Pressure Ratio Indicating System provides you with the most accurate method of thrust measurement... assures you of optimum safety in take-off and fuel economy at cruise. The unique Transducer design is being applied to other aircraft instrumentation including: machmeters, high accuracy altimeters and air data systems.

EXTREME ACCURACY—±0.01 pressure ratio at room temperature; ±0.02 pressure ratio from −55°C to +70°C, ±.025 pressure ratio to 120°C.

HIGH RELIABILITY—withstands high over-pressures... eliminates hysteresis effects to insure long-life dependability. Operates at altitudes from 0 to 75,000 feet.

RUGGED DESIGN—will meet latest military and commercial requirements. Engineered for simplified maintenance. Exclusive floating disc suspension insures accuracy under environmental conditions of MIL-E 5272A.

FLEXIBILITY—three basic systems which can be adapted to your particular needs. Transducer withstands high temperatures and vibrations of engine mounting.

For complete details write for data file #043.

Visit our Exhibit at the **IRE NATIONAL CONVENTION** Booth 629-631 March 19th thru 22nd

NORDEN-KETAY CORPORATION

Instrument and Systems Division
Wiley Street, Milford, Connecticut

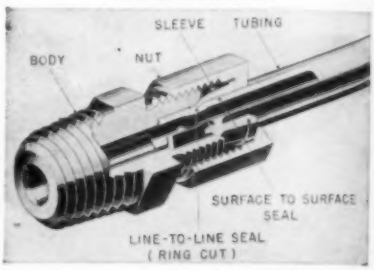
Circle No. 16 on Reader Service Card.

NEW PRODUCTS

motors specifically developed for electronic devices. The company is currently filling military orders for use in cooling aircraft electronic components. Other applications for civilian purposes are being studied.

Circle No. 151 on Reader Service Card.

TUBE FITTING



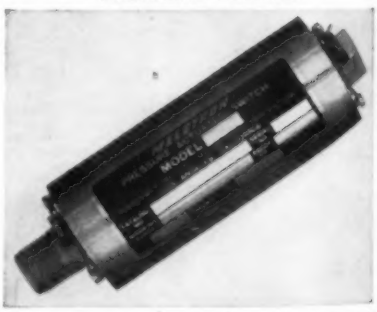
A new aircraft tube fitting tradenamed Selfalign is offered by the **Weatherhead Co.** One major advantage is that it can be installed without disassembling. The tubing is inserted in the fitting until it "bottoms" and the nut is tightened.

Selfalign is suited for instrumentation and all other low- and medium-pressure applications using copper and aluminum tubing. A dual sealing principle is said to assure positive, leakproof connections.

Available brass fittings from stock come in sizes $\frac{1}{8}$", $\frac{3}{16}$", $\frac{1}{4}$", $\frac{5}{16}$", $\frac{3}{8}$", and $\frac{1}{2}$". Aluminum fittings are made to order.

Circle No. 152 on Reader Service Card.

PRESSURE SWITCH



A pressure switch for fuel, oil, pneumatic and hydraulic applications, said to be the result of eight year's research and development, is offered by **Meletron Corp.**

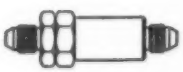
The switch, designated Model 1400, is specifically designed for jet-engine use and other applications in which extremely high temperature and vibration are problems. It employs either an aluminum or a stainless steel actuator (sensing element) with a range up to 400°F. Length of switch body is 3½ in. and diameter 1½ in.

Model 1400A, for pressures to 800

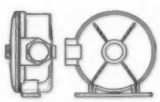
Special lightweight filter designs SERVE VARIETY OF AIRCRAFT APPLICATIONS

G-159J and G-198J— Main line hydraulic, monel or stainless element, aluminum body. Knife blade cleaning. Two sizes give wide range of capacity.

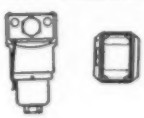
G-200M — Hydraulic actuating valves and cylinders. Two-way restrictor stops dirt for either direction of flow. Available with either internal or external connections.



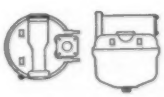
G-205M — Hydraulic pipe lines. Light weight—1¾ oz.



PA-12-8—Intake filter for instrument air Micronic* element. Weight 25 ounces. Removes dust and vapor.



PR-400 series. High pressure hydraulic line, ½, 3, 6 & 12 G.P.M. military approved (MS-28720).



PR-115—Aviation fuel at high flow rate. Micronic* element. 1500 gph capacity. Operating pressure 0 to 50 psi.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

*Registered Trade Mark

For 25 years, Purolator has led the development and production of special lightweight filters for oil, fuel, hydraulic fluid and instrument air for military and commercial aircraft. The Purolator filters shown in this ad are standard units that have proved themselves aboard hundreds of thousands of aircraft.

SPECIAL MODELS ARE AVAILABLE

We invite your inquiry about variations or completely new types (not listed here) designed to meet individual aircraft or missile requirements.

MAIL COUPON FOR DESIGN INFORMATION

Purolator Products, Inc.,
Dept. AI-42, Rahway, New Jersey

Please send me the following filter information

- ☐ Filters for the Aircraft Industry
- ☐ Here is a schematic drawing of our equipment. What Purolator unit would you suggest?

Name_____ Title_____

Company_____

Address_____

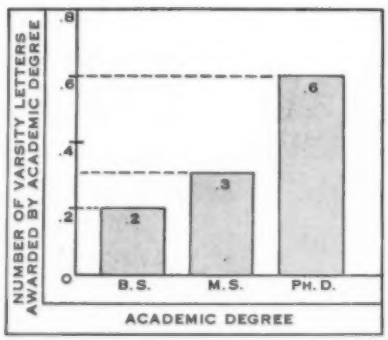
City_____ Zone____ State_____

SIDELIGHTS ON THE SCIENTISTS *number* **3** *of a series*

Brain and Brawn

Some of the young fellows on our staff have been analyzing our files of personal data regarding scientists and engineers here at Hughes. What group characteristics would be found?

With additional facts cheerfully contributed by their colleagues they have come up with a score of relationships—some amusing, some quite surprising. We shall chart the most interesting results for you in this series...



Contrary to popular belief, higher academic study goes hand in hand with increased school athletic activity—as shown in the above chart. This is based on data obtained from a 20% random sample of the 2400 professional engineers and scientists of Hughes Research and Development Laboratories.

In our laboratories here at Hughes, more than half of the engineers and scientists have had one or more years of graduate work, one in four has his Master's, one in 15 his Doctor's. The Hughes research program is of wide variety and scope, affording exceptional freedom as well as exceptional facilities for these people. Indeed, it would be hard to find a more exciting and rewarding human climate for a career in science. Too, the professional level is being stepped up continually to insure our future success in commercial as well as military work.

Hughes is pre-eminent as a developer and manufacturer of airborne electronic systems. Our program includes military projects in ground and airborne electronics, guided missiles, automatic control, synthetic intelligence. Projects of broader commercial and scientific interest include research in semiconductors, electron tubes, digital and analog computation, data handling, navigation, production automation.

DUE TO THE *expanding use of Hughes electronic systems, new positions are open for engineers who have demonstrated ingenuity and inventive ability in the areas of product design.*

SCIENTIFIC STAFF RELATIONS

Hughes

RESEARCH AND DEVELOPMENT LABORATORIES

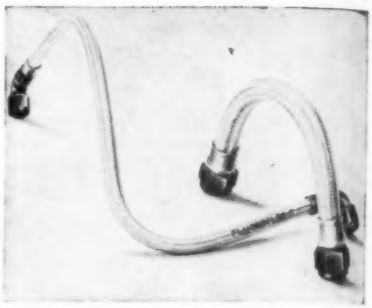
Culver City, Los Angeles County, California

NEW PRODUCTS

psi proof, weighs .36 lbs; Model 1400S, for pressures up to 5,000 psi proof, weighs .65 lb.

Circle No. 153 on Reader Service Card.

PREFORMED HOSE ASSEMBLIES



Teflon hose assemblies, preformed at the factory, that are said to save weight and space and eliminate the need for special elbows, are available from the **Resistoflex Corp.**

Designated Preformed Fluoroflex-T R3800, the hose has a -100 to plus 500°F ambient temperature range, 1,000 psi working pressure and complete inertness to all known oils, fuels and propellants, according to the manufacturer.

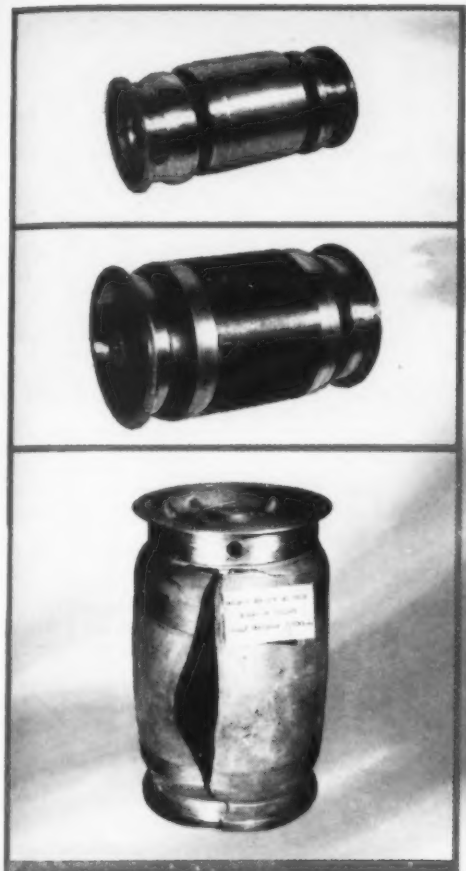
Circle No. 158 on Reader Service Card.

SERVO MOTOR GENERATOR

John Oster Mfg. Co., Avionic Division has developed a 19,600 rpm servo motor tachometer generator for continuous operation at 140° C. The device has a size 11 2-phase, 2-pole servo motor and a drag cup type tachometer in a unit measuring 1.03 inches in diameter, 2.156 inches long that weighs 4.6 ounces. Input is 26 volts 400 cycles. Stall torque is 0.26 ounce/inch minimum and stall wattage is 12.5 watts.

The generator portion uses 26-volt, 400-cycle excitation at 3.7 watts, and has 0.35 volts per 1,000 rpm output voltage. Residual voltage is 23 millivolts. Output impedance is 500 ohms. Linearity is 1 per cent to 8,000 rpm.

Circle No. 156 on Reader Service Card.



Top photo shows missile tank constructed of two forged and machined end caps and center section of tubing. Middle photo shows assembled tank. The *Uniwelds* are located in the approximate center of the bright machined bands. Bottom photo shows a tank that has been pressured to bursting with 2½ times normal operating pressure. Note that the split crosses both weld planes with no tendency to divert and follow the weld—graphic proof of 100% parent metal weld strength.

MISSILE TANKS *called for Pioneering, too!*

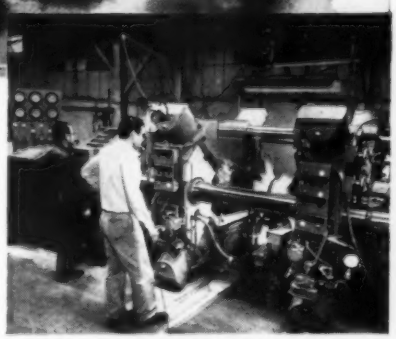
MENASCO UNIWELDS

PROVIDE FULL STRENGTH UTILIZATION IN HEAVY WALL PRESSURE VESSELS

Missile components, like the overall Missile System, have demanded that their designers and engineers pioneer with fresh thinking and new ideas in order to keep abreast of modern guided missile research and development. A case in point is MENASCO'S design and production of air tanks for the Nike missile featuring MENASCO'S now-famous *Uniweld* process, an exclusive method of pressure welding.

The twelve-inch diameter welds in the Nike tank fuse in two operations approximately 34 square inches of alloy steel. Because the *Uniweld* maintains parent metal strength, no increase in local wall thickness is needed and the tank becomes virtually a one-piece vessel.

Thus, MENASCO'S pioneering work in *Uniwelding* of missile tanks has opened entire new fields of pressure vessel applications where high strength welds make the difference.



One of MENASCO'S *Uniweld* machines in operation. This exclusive MENASCO process is gaining wide acceptance in the aircraft and missile fields.

Specialists in Aircraft Landing Gear

menasco manufacturing company

805 SOUTH SAN FERNANDO BOULEVARD, BURBANK, CALIFORNIA

People

MANUFACTURING

C. D. W. Thornton will head the Farnsworth Electronics Co.'s activities in atomic energy, as asst. to the president.

Raymond A. Rugge elected vice president—research and development of the W. L. Maxson Corp.

C. A. Thomas promoted to gen. mgr. of sales for Stratoflex, Inc.

Rugge

Thomas

C. G. (Chet) Miller, formerly of Douglas Aircraft Co., appointed director of advertising and public relations for Pastushin Aviation Corp.

Clare Mason joined Electronic Specialty Co. as executive vice president.

Fred L. Schwab named gen. Sales mgr. and **Stanley McClean** named works mgr. of Phillips Control Corp., Joliet, Ill.

Michael S. Dayton appointed sales mgr. of the Arga Div. of Beckman Instruments, Inc.

S. J. Pipitone appointed mgr. of the design analysis department, Goodyear Aircraft Corp.

George M. Owen appointed production mgr. at Taylorcraft, Inc.

E. A. Ritti named director of engineering at Burton Rodgers Technical Training Aids, Inc.

J. W. Fedor appointed gen. sales mgr. for Breeze Corporations, Inc.

James H. Brewster III appointed director of customer relations of the Electronic Systems Division of Sylvania Electric Products Inc.

L. R. (Mike) Hackney named asst. to the president of Air Logistics Corporation; **E. Van Vechten** named mgr. of airline sales.

John A. Doremus elected vice president—engineering of Aircraft Radio Corp. of Boonton, N. J.

James Beam appointed advertising mgr. of Hughes Aircraft Co.; **Dr. Renne S. Julian** named technical director of Hughes guided missile laboratories.

William P. Kennedy promoted to asst. manager—sales engineering for Lockheed Aircraft Corp.

James P. Malmstrom appointed gen. mgr. of United Aircraft Products, Inc.

D. H. Voss moves to Douglas Aircraft's new Long Beach facility for final assembly of the DC-8 as plant supt.

J. Terry Taylor named mgr. of fuel cell operations for B. F. Goodrich Co.'s aeronautical products mfg. dept., with headquarters in Los Angeles.

Herbert O. Patchel, Jr., named v.p. and asst. to the president of Rheem Mfg. Co. with headquarters in Phoenix, Ariz.

Jack Wright promoted to asst mgr. of The Garrett Corp.'s aero engineering div.

GOVERNMENT

Robert L. Nuber appointed Director of Aeronautics for the State of Washington, succeeding Charles S. Chester, resigned.

Lt. Col. Jack Ridley, chief of the flight test engineering laboratory at the Air Force Flight Test Center at Edwards AFB, transferred to the Military Advisory Assistance Group in Japan.

Ross I. Newmann, former assistant to ex-CAB Member Josh Lee, named Chief of CAB's International and Rules Division, Office of General Counsel.

Maj. Gen. James E. Briggs, USAF, will become Superintendent of the Air Force Academy August 1, replacing Lt. Gen. Hubert R. Harmon, retiring.

William Downs, formerly asst. administrative engineer in Public Works, named director of airports for Chicago.

George M. McSherry named asst. gen. mgr. of Port of New York Authority's four metropolitan airports, succeeding **Edwin Sorensen,** who became gen. mgr. of operations of PNYA's Terminals Department.

AIRLINE

Capt. John E. O'Brien appointed chief pilot for Ozark Air Lines.

David A. Highman named staff manager—commercial and military airfreight sales for American Airlines.

William P. Ferree made West Coast public relations manager for KLM Royal Dutch Airlines.

Glen G. Magnuson appointed mgr. of sales development for United Air Lines; **R. L. Mangold** named mgr. of cargo sales.

Magnuson

Jack Morris made superintendent of maintenance for Riddle Airlines.

William C. Roettgen became sales promotion representative—special events, Latin American Div. of Pan American World Airways; **W. Kenneth Fortner** succeeds him as div. advertising distribution mgr.

HONORS

William G. Purdy, chief engineer of Martin's Denver Division, named by University of Missouri to receive the Missouri Honor Award for Distinguished Service in Engineering in connection with his work in developing and testing upper-atmosphere Viking research rockets.

Gen. Nathan F. Twining, Chief of Staff of the U.S. Air Force, will receive the Gen. William Mitchell Award of the Aviators' Post No. 743 of the American Legion for 1956.

★**Alden M. Drake,** Pratt & Whitney Co. Head of development and equipment, small tool and gauge division, West Hartford, Conn. (38 yrs.)

★**Ray W. Ireland,** United Air Lines. Vice president—traffic, Chicago. (30 yrs.)

★**D. J. Bosio,** Douglas Aircraft Co. Director of material, Santa Monica, Calif. (30 yrs.)

★**Ben Groth,** American Airlines, Foreman, Maintenance base, Midway Airport, Chicago. (30 yrs.)

Carl A. Walterhoefer, North American Aviation. General foreman experimental manufacturing, Los Angeles.

C. R. Irvine, Convair. Dept. 1-71, San Diego, Calif.

J. P. Strachan, Convair. Dept. 60, San Diego, Calif.

R. F. Webber, Convair. Dept 603-2, San Diego, Calif.

quickly dependably with VISUTAC® determine *any* motor speed —in flight or on ground (non-contact) portable tachometer

Measures speeds from safe distance by "stopping" motion. Accurate to within 2% of true speed, and lightweight.

•

Self-contained. Determines rotary and vibratory speeds. Made in two basic ranges: 500 to 8,000 and 1,000 to 16,000 rpm-vpm.

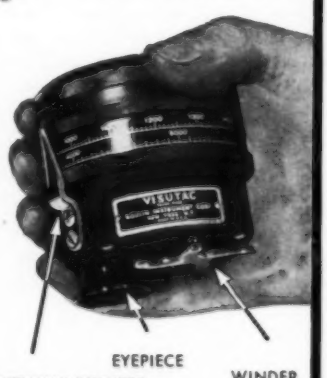
•

Works perfectly in artificial or bright sunlight at 3 ft.-100 ft. No power cord. All mechanical; convenient and durable.

•

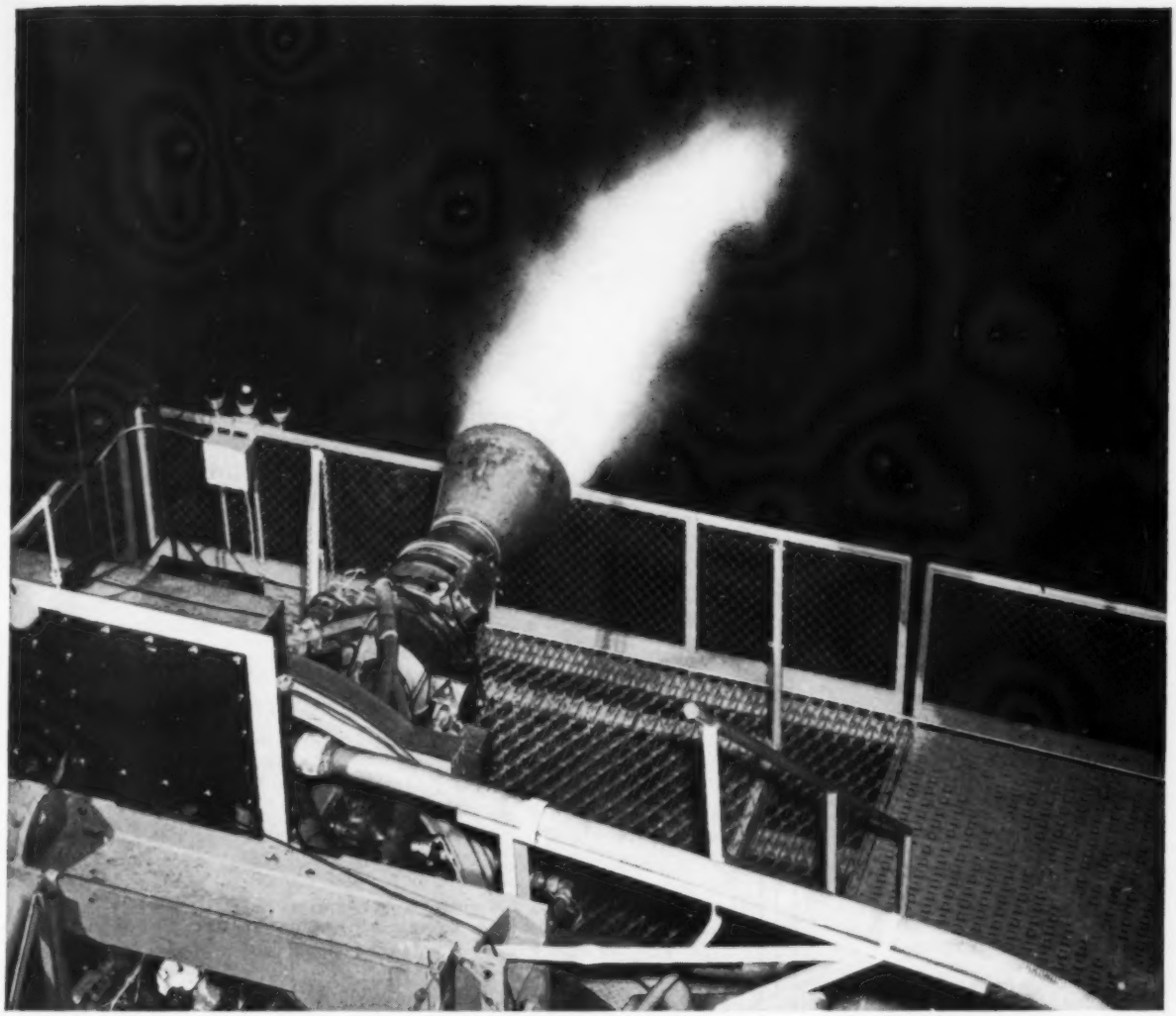
Used daily by major airlines, ground service personnel, and engine manufacturers.

write for complete Data: Bulletin A-1



Boulin Instrument Corp.
65 MADISON AVE., NEW YORK 16, N. Y.

Circle No. 18 on Reader Service Card.



Night firing tests on early ROCKETDYNE engines helped speed the development of today's models whose power cannot be disclosed.

Today's Rocket Engine can send a missile half-way around the earth

Even as you read this, rocket engines capable of sending a guided warhead half-way around the earth are being developed and produced by ROCKETDYNE, a Division of North American Aviation, Inc. . . . and larger, still more powerful units are on the way.

Behind these bare facts is a 10-year story of how the Air Force and ROCKETDYNE faced up to one of the biggest engineering challenges of the last decade. Security restrictions do not permit us to give you the details, but we *can* tell you that ROCKETDYNE has manufactured the largest liquid-propellant rocket engine in the free world. ROCKETDYNE is developing and producing rocket engines for many of the major guided missile projects in this country.

If you are an engineer—and interested in this young and challenging field—write ROCKETDYNE, Personnel Manager, Dept. A-2, 6633 Canoga Ave., Canoga Park, California . . . located near Los Angeles in the West San Fernando Valley.

ROCKETDYNE *A Division of North American Aviation, Inc.*

BUILDERS OF POWER FOR OUTER SPACE

AIRCRAFT ENGINEERS WANTED

FOLLOWING POSITIONS Open For Immediate Employment

- Aerodynamicist
- Dynamics Engineers
- Electronics Engineers
- Electrical Engineers
- Hydraulics Engineers
- Weight Engineers
- Stress Engineers

ALSO

- Mathematicians
- Physicists

Hayes is one of the largest aircraft facilities in the United States, located in sunny South where industrial development leads the Nation. List your qualifications for any position shown above and mail to A. V. Welsh, Employment Manager.

Hayes

AIRCRAFT CORPORATION
P. O. BOX 2287
BIRMINGHAM, ALABAMA

West Coast Talk . . . By Fred S. Hunter

- **Douglas working on medium-range jet.**
- **DC-7Cs should make hit with passengers.**

NEVER a dull moment in the jet transport field. First, everybody was trying to see how much bigger they could make 'em. Now, they're drawing pictures of junior-size models. Douglas, for example, is proposing one for short and medium ranges in the 130,000-pound category. It would carry about 62 passengers. In this model, Douglas is after superior operating economies more than peak performance. It would be in the 500 mph class. Powerplant Douglas has in mind is P&W's J52. This is a two-spool engine—on the order of 7,500 pounds thrust. The engine hasn't flown yet, but P&W has had it under development for the Navy, on a sort of low-priority basis, for a number of years.

Hunter

* *

The smaller Douglas jet may be the aircraft to take up the space and manpower which will become available at Santa Monica when DC-6/7 production finally reaches the end of the line. But when will that be? Latest model in this line—the DC-7C—is just reaching the delivery stage. This, let it be known, is going to be a very useful airplane. Its merits have been glossed over temporarily by the glamor of the DC-8, but they'll become quite apparent as soon as the airplane begins flying the Atlantic this summer.

New model Wright EAI engines, which develop 3,400 hp for takeoff and 2,850 on low blower at rated power, look quite good. They've been consistently delivering all their power in the testing flying. Flight characteristics of the DC-7C are excellent. Stalling speed came out even lower than expected. Stability is the best in the series. Douglas even was able to move the CG range back 2½ degrees.

The C also has more elevator effect. Pilots found they could land with tail down and power off and still do a smooth job. But it is in the lower noise and vibration levels that the DC-7C is going to make its really big hit with passengers. New position of engines and propellers more than balances the higher power of the EA1 engines, and actually makes the passenger comfort zone comparable to that of the DC-6. Douglas has sold 104 DC-7Cs. It will sell more, and you'll still see this airplane flying the air trade routes of the world long after the jets are in operation.

* *

If any body in Britain should chance to exhibit any curiosity in Convair's proposed medium-range jet transport, watch 16 inches be added to the wingspan in a hurry. The Convair design calls for a wingspan of 118 feet 4 inches. Aircraft sold to Britain, to escape duty payment, must be 120 feet or more. Of course, the way the jet situation is in England politically, Convair probably feels the possibility of making a sale to the British is quite remote, at this time.

* *

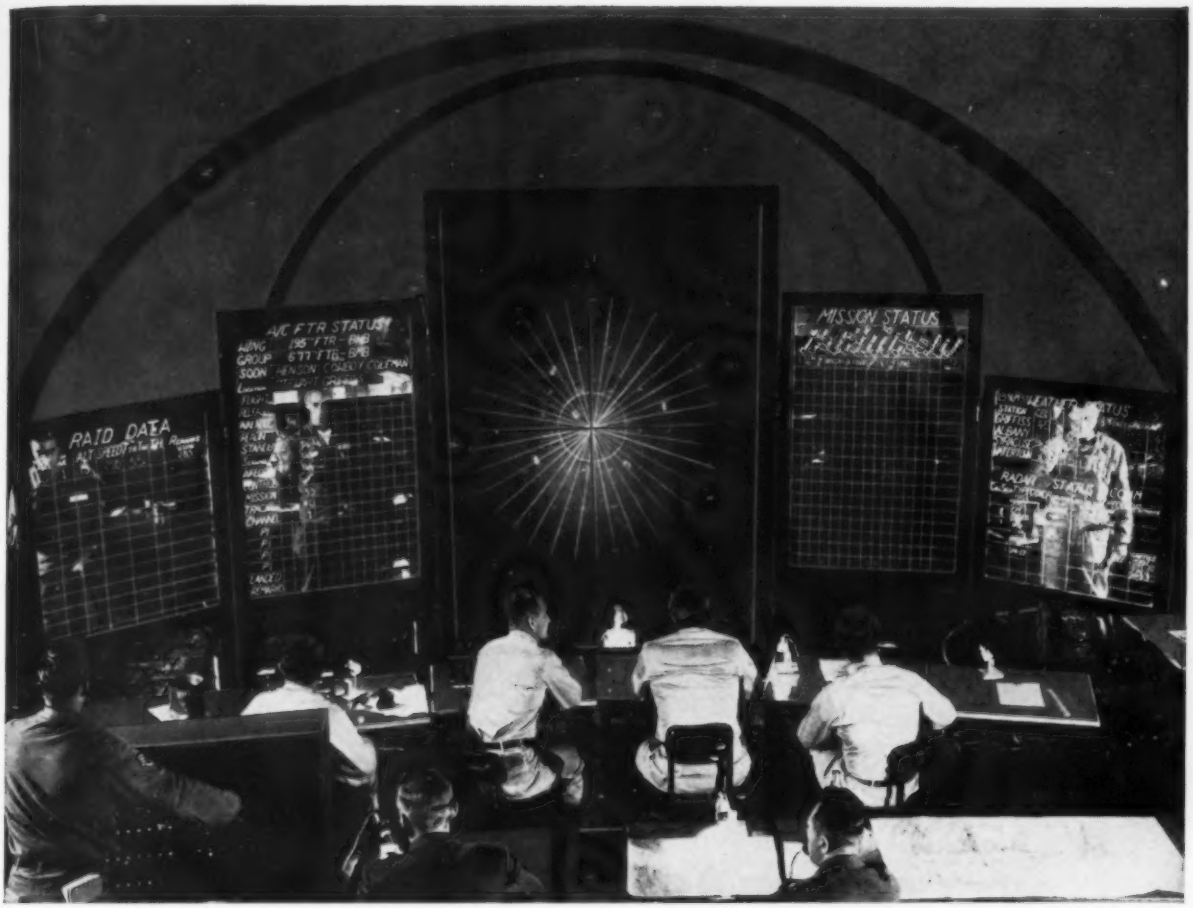
Lockheed Air Terminal went in for battleship, rather than aeronautical, design principles in constructing its Aerobridge, which the Air Force is now evaluating at Fairfield and Tinker. It's all cast iron; no aluminum. Ramp crews can whack it around as they please, and never make a dent in it.

* *

The $5,250,000 supplemental contract recently received by Marquardt Aircraft will carry its RJ43 ramjet engine through preliminary flight-rating tests to ready it for guided missile application. New prime contracts to cover type-testing, production studies, tool design, tool construction for a pilot line program and a limited amount of hardware are due soon. The RJ43, of course, is the ramjet scheduled to power Boeing's Bomarc.

* *

Convair's F-102B will probably be given a new number before it goes into production . . . Tex Johnston, Boeing's flight chief, calls the turbojet transport the most important development in aviation since Kitty Hawk, which we think is putting it beautifully . . . This year's AD at Douglas El Segundo, the AD-7, will include a tanker version . . . Industry was well pleased by CAA appointment of Walter Plett as 4th Region's administrator.



Official U.S. Air Force Photograph

Friend or foe? Tactical defense officers in MINK control center watch movements of aircraft as reported from radar warning sites. This is equipment developed under the direction of Rome Air Development Center.

ROME AIR DEVELOPMENT CENTER PROVIDES AIR DEFENSE EQUIPMENT FOR OUR AIR FORCE

One development agency for the Air Force's ground-based electronic equipment is Rome Air Development Center, located at Griffiss AFB in Rome, N. Y. One of the ten centers of the Air Research and Development Command, RADC is concerned with the air defense of our nation, with providing equipment for tactical supremacy, and with developing ground complexes for various navigation systems to aid all aircraft. In addition, RADC is charged with data handling improvements for the Air Force intelligence mission.

RADC is the responsible center for development, through its various contractors, of such end products as radar sites, including improved tubes, circuits, antennae, and shelters; ground communications equipment and associated support items; IFF (Identification Friend or Foe) environments, and electronic countermeasures.

Bringing complex systems from the written requirements to the actual hardware items to be used in the various Air Force commands is a long and tedious business which draws upon the skills of RADC's 500 civilian and military engineers and their many counterparts in private industry.

84

FORD INSTRUMENT COMPANY

DIVISION OF SPERRY RAND CORPORATION

31-10 Thomson Ave., Long Island City 1, N. Y.

This is one of a series of ads on the technical activities of the Department of Defense.

Engineers at Ford Instrument Company working on a special Air Force project in one of the company's laboratories.

TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN

STRUCTURES

STRUCTURES ENGINEERS are offered unusual career opportunities at Convair, in beautiful San Diego, California, in new, long-range projects associated with the requirements of high-speed flight. Thermal stress, creep and fatigue considerations have opened fields in design and analysis which are new and inviting to the engineer with a good background in basic structural and material concepts. Current openings at all levels in design and research groups. Excellent facilities are available in structural test laboratories for substantiation of theories. Advanced electronic computers, both analog and digital, are at the disposal of structures personnel.

CONVAIR offers you an imaginative, explorative, energetic engineering department...truly the "engineer's" engineering department to challenge your mind, your skills, your abilities in solving the complex problems of vital, new, long-range programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

SMOG-FREE SAN DIEGO lovely, sunny city on the coast of Southern California, offers you and your family a wonderful, new way of life ... a way of life judged by most as the Nation's finest for climate, natural beauty and easy (indoor-outdoor) living. Housing is plentiful and reasonable.

Generous travel allowances to engineers who are accepted. Write at once enclosing full resume to: H. T. BROOKS, ENGINEERING PERSONNEL, DEPT. 216

CONVAIR

A Division of General Dynamics Corporation

3302 PACIFIC HIGHWAY · SAN DIEGO, CALIFORNIA

International Aviation

By Anthony Vandyk

The extent that landing charges differ throughout the world is pointed up by the International Civil Aviation Organization in the latest edition of its *Manual of Airport and Air Navigation Facility Tariffs* (price: $2.50). Representative daytime landing charges for a DC-6 on a scheduled international flight vary from a low of $2 at Honolulu to a high of $150 in the Dominican Republic.

Close behind Ciudad Trujillo's fee are the charges at Paramaribo in Surinam ($146.73), Fiji ($139.28) and Rio de Janeiro ($137.07). At the other end of the scale, airports with very low charges include: Mexico City ($5.12); Managua, Nicaragua ($6); Santiago de Chile ($10.90); and Madrid ($10.96).

• **In the U.S.** charges vary from $15.95 at Boston to $72.15 at Idlewild (latter includes porter service, incinerator service and inspection space). Miami charges $48.50 for each landing where less than ten a month are made.

North of the border the price goes up steeply. The charge for the first landing or the last-off at a Canadian airport on a transocean flight is $130.35 plus $13.42 for operational telecommunication service. In certain areas of the world, notably the Caribbean, the landing fees do not include the use of air navigation facilities, which are charged separately.

• **The Caribbean area** is full of anomalies. In Haiti the charge is $105.35, while on the other side of the island in the Dominican Republic it is $150.50. Yet on the adjacent island of Puerto Rico only $18.60 is charged. Within the British West Indies there are some big differences although the charges are generally low. At Grenada the charge is $15.40 while at nearby St. Lucia it is double—$30.80.

European airport charges are as inconsistent as those in other continents. At London the fee is $63 (including "special surcharge" but not passenger charges) while at Amsterdam it is $28.29, and at Lisbon it is $12.17. Shannon charges $65.10 for each landing where less than 16 a month are made. Rome, one of the key transit airports in Europe, has a landing charge of $16.34.

In Asia there are the usual inexplicable differences between the charges; at Cairo it is $24.28; Karachi, $45.33; Calcutta, $31.50; Bangkok, $68.52; Singapore, $65; Hong Kong, $22.85; and Tokyo, $43.89. At Australian airports the charge is $73.70 while in New Zealand it is $113.40. These ICAO-listed charges are for DC-6 aircraft landing by day. In a few countries night charges are higher, usually about 20%.

France Buys 50 H-21s, 50 Sikorsky S-58s

The French government has ordered 100 U.S. helicopters for use in Algeria —50 Vertol H-21Cs and 50 Sikorsky S-58s. The Vertol models are being supplied through SNCA du Sud-Ouest which has signed an agreement with the Morton, Pa., company giving the French manufacturer an option for the future procurement from Vertol of complete aircraft and/or components.

The agreement also provides for the immediate licensing of SNCASO for the maintenance, overhaul and repair of H-21s. An additional option provides for licensing the French company for the manufacture of complete aircraft.

The S-58s are being bought by the French government from SNCA du Sud-Est, which has been Sikorsky's French licensee and representative for several years. It is probable that SNCASE's license agreement will be extended to include the S-58.

In addition to the H-21Cs and S-58s, the French government is buying helicopters from various sources. It has ordered 60 Bell 47s from the Italian licensee, Agusta. Fifty S-55s are being obtained from miscellaneous suppliers including SNCASE, Britain's Westland Aircraft and SABENA Belgian World Airlines.

The government is also buying large quantities of French helicopters—180 SNCASE Alouettes and 50 SNCASO Djinns. All the above-mentioned rotorcraft are to be delivered between June 1956 and the end of 1957.

TRANSPORT BRIEFS

British European Airways will start service to Venice, Bergen and Gothenburg this summer . . . **KLM Royal Dutch Airlines** plans to begin service to Ankara, Khartoum and Warsaw this year . . . **Lufthansa German Airlines** will inaugurate a twice-weekly service to Rio de Janeiro, Sao Paulo and Buenos Aires on August 15. It will start a twice-weekly service to Istanbul, Beirut, Baghdad and Teheran September 14.

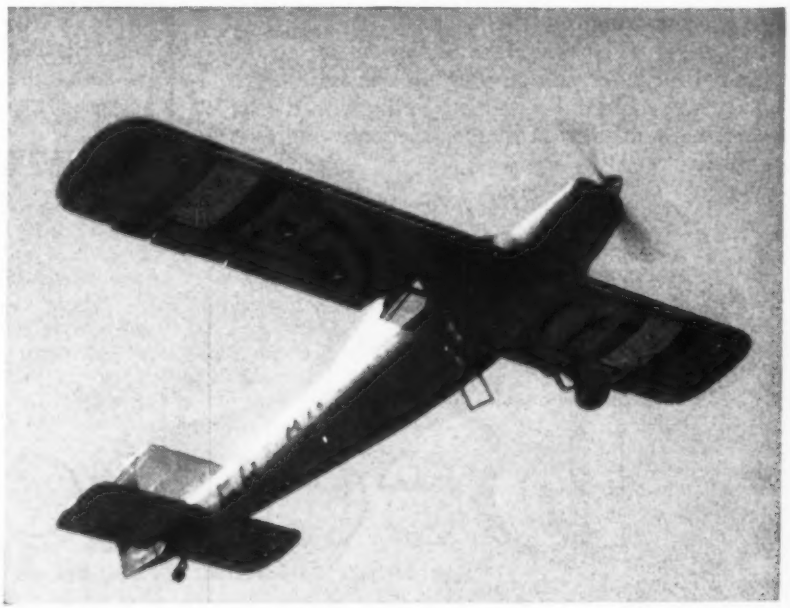
MILITARY BRIEFS

Germany's Navy is to be equipped with **Hawker Sea Hawk** fighters . . . The French and U.S. governments have approved the supply of 12 Dassault Mystere 4 fighters to the **Israeli Air Force** . . . The **French Navy** has taken delivery of 50 SNCASE Aquilon (Sea Venom) fighters to date. Forty more are in production and the latter are of a single-seat version.

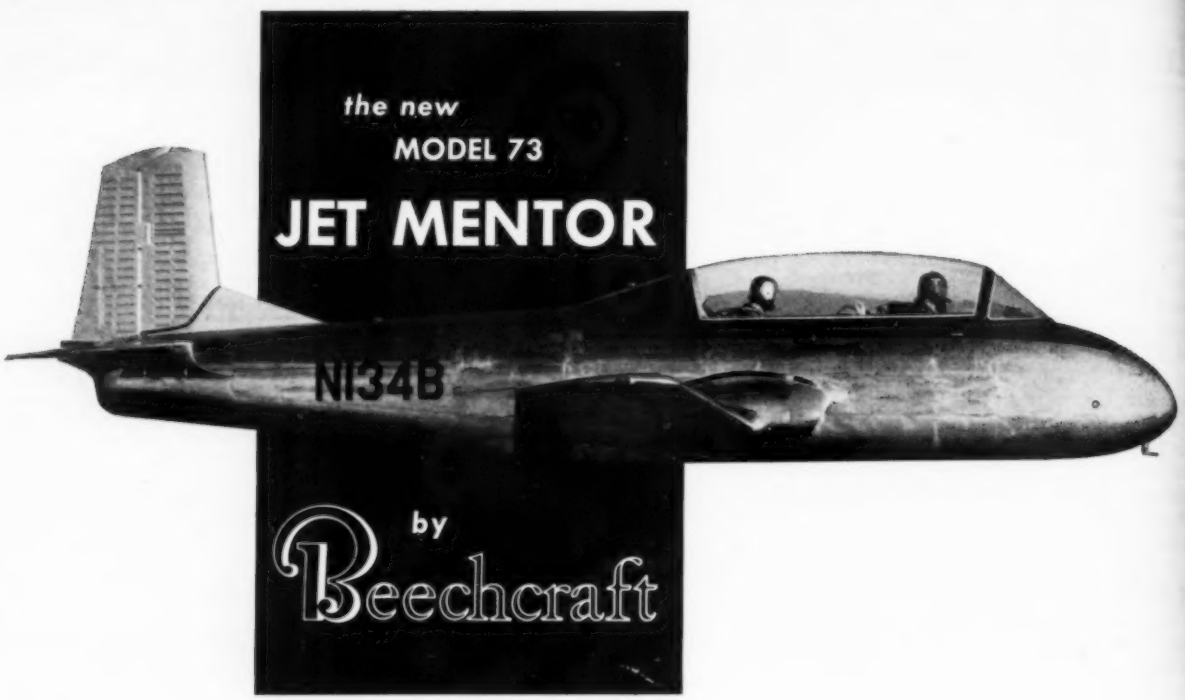
MANUFACTURING

Vickers-Armstrongs has started delivering Valiant jet bombers fitted for flight refueling. They are the first production aircraft for the RAF so equipped.

Germans to Build 500 of These



Dornier Do-27 Lycoming-powered liaison aircraft has been ordered for German armed forces. About 400 to 500 will be built in Germany. Prototype, shown here, was built in Spain.



BEECHCRAFT has designed and built another outstanding military trainer at its own expense and risk — and now offers it to the military services throughout the free world as the WORLD'S MOST ECONOMICAL JET TRAINER.

The Model 73 Beechcraft Jet Mentor is based on the famous Beechcraft T-34 Mentor, in daily use by the military forces of the United States and many foreign countries.

In flight and handling characteristics the two airplanes are so alike that transition from one to the other will be a very simple step for a student; or in fact the student could start his training with the Jet Mentor without previous flight experience. Inquiries are invited.

The Beechcraft Model 73 Jet Mentor
PERFORMANCE AND SPECIFICATION DATA

(Engine: Continental J69-T-9 Turbojet)

Cruising Speed	245 mph
High Speed (at 15,000 feet)	295 mph
Diving Speed	500 mph
Service Ceiling	28,000 feet
Range (maximum with reserve)	450 miles
Gross Weight	4,521 pounds
Empty Weight	2,925 pounds
Useful Load	1,596 pounds
Load Factor (ultimate)	11.25 G's
Rate of Climb	1,400 fpm

Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

BEECH BUILDS: T-34 Trainers for the USAF and USN; L-23 Transports for the U. S. Army; the Model 73 Jet Mentor; MD-3 Mobile Power Generators; and for Business — the Beechcraft Super 18 Executive Transport, the Beechcraft Twin-Bonanza and the Beechcraft Bonanza.

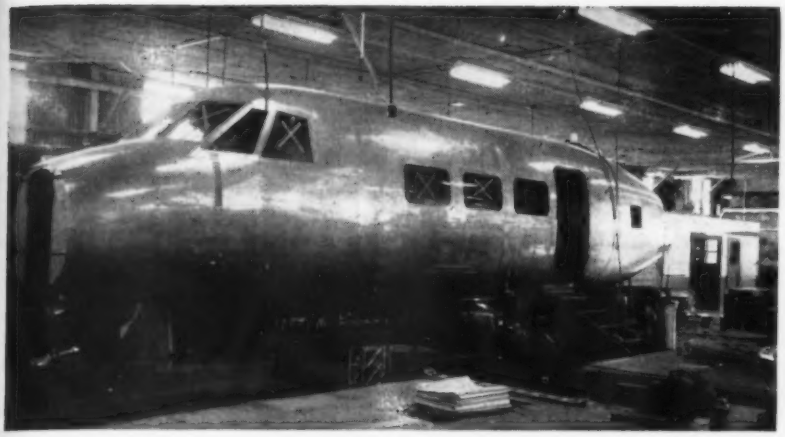
subscription

order card

subscription

order card

Cessna Assembling 620 Prototype After Year's Tests of Components



This is how fuselage of Cessna Model 620 looks following series of critical load tests on structure during past year. Final assembly of components is under way.

Cessna Aircraft Company revealed that the final assembly of its Model 620 four-engine executive transport prototype is in progress, following completion of a year's tests on various component parts and systems. Dwane L. Wallace, president, declined to announce a date of the first flight, but said it would be "sometime in the near future." Unofficial estimates have ranged from April 1 to mid-summer.

Status on static tests were reported as follows:

• Structural proof tests on tail surfaces, nose gear, fuselage and pressurized portions successfully completed.

• Functional tests on tricycle landing gear, hydraulic and electric system have concluded 4,500 complete cycles of operation.

• Developmental testing of the fuselage has been approved, with the wing in final stages of testing and assembly.

• Preliminary ground-testing of the specially developed AiResearch pressurization unit has been concluded.

• Hydrauliscope fatigue checks on the hydraulic system have been completed.

Cessna also has announced that in the past 18 months it has coordinated with Continental Motors in testing the GSO-526 supercharged powerplant that will power the four-engine transport.

Plans call for inaugurating production plans while the plane is being flight-tested and evaluated. In the meantime, market surveys will continue.

AOPA Asks Specific Visibility Standards

A petition to establish specific regulations for cockpit visibility standards has been filed with the Civil Aeronautics Board by the Aircraft Owners and Pilots Association. It has requested CAB to amend present Civil Air Regulations to set up specific, measurable visibility standards for cockpit design of all civil aircraft, both airline and general.

Present regulations, the petition states, are in general terms and air carrier type airplanes do not allow the visibility airline and large aircraft manufacturers themselves have recommended through a committee of the Society of Automotive Engineers.

"The record of aircraft collisions," AOPA contends, "demonstrates that an important factor common to collisions, which factor caused or contributed substantially to the cause of the accidents, was the limited visibility from the cockpit of either one or both of the planes involved."

• **AOPA has requested** that CAB amend Section 3.382 (non-carrier aircraft) and 4b.351 (air carrier aircraft). The regulations, it is stated, "are general in terms and do not provide for adequate minimum standards of cockpit visibility." It is felt that the amendment should provide "specific measurable standards" of visibility as follows:

• Angle forward above and below the horizon unbroken.

• Angle above and below the horizon 90 degrees to the left.

• Angle to the left and angle to the right.

Business Flying Briefs

• **Piper Aircraft** Co. last month rolled out its 500th Twin Apache four-place business transport. Production is being stepped up to two-a-day by June. Current backlog includes orders up to September 10.

• **Southern Airways** of Atlanta has established an aircraft brokerage department and has named Thomas R. Foster to head it. The new service for buyers and sellers of business aircraft will concentrate on multi-engine aircraft. Southern, a Beechcraft distributor, also has offices in Birmingham, Ala. and Charlotte, N. C.

• **Florida Forest Service** has taken delivery on four 1956 Piper Super Cubs to be used for forest fire detection, "smoke sorting," aerial reconnaissance and law enforcement work. During the periods of low fire danger, the Super Cubs will double in service for air surveys and checking insect and disease damage on large timber tracts. Planes will be stationed at Tallahassee, Panama City, Lake City and Ocala.

• **Met-Co-Aire** of Fullerton, Calif., has announced the marketing of a conversion kits for tricycle gear on the Cessna 180. A similar kit for the Cessna 170 was announced earlier. Regular spring leaf gear is used by moving it back 30 inches and installing it into a new box section. Nose wheel attaches to the lower motor mounts forward and aft at the junction with the firewall. Total weight added on the 180 is 34 lbs.; and 33 lbs. on the 170. Kit price for the 180 is $1,045 and $950 for the 170.

New Firm Offers Course for Pilots

A major headache to the business pilot, flying heavy schedules and carrying time-consuming administrative duties, is how to find time for his flight check and keep himself informed on all new developments in his profession.

A New York consultant firm has come up with these answers: (1) a comprehensive, intensive flight-evaluation program that can be completed in three days; and (2) a two-day seminar including lectures and discussions on new data for the pilot.

Executive Air Transport Co., headed by Harry R. Van Liew, a senior pilot with United Air Lines, set up to serve as consultants for executive aircraft operations, has fathered the two pilot programs.

By tailoring the flight evaluation program to the individual pilot needs, EATC provides an intensive instrument and en route check (in the pilot's own plane). The second day is spent on

weather and the third day on air traffic procedures and practices and other subjects felt necessary.

At the conclusion of the instrument and en route check, the EATC "examiner," a practicing airline pilot, presents the pilot with a written advisory—confidentially—covering procedures for increasing proficiency for the pilot and his crew.

The second pilot service is the Seminar, where qualified lecturers cover problems of weather, new equipment, air traffic control and other pertinent operational data. From 9 a. m. until 9 p. m, lectures and discussions are under way.

The Spring seminar has been scheduled for April 20 and 21 at the University Club in New York. Guest lecturers will be: W. B. Beckwith, assistant director of United Air Lines Meteorological Department, who will focus on East Coast weather, fog, radar interpretation of thunderstorms, tornadoes and hail; Frank White of the Air Transport Association, who will discuss airborne radar and touch on surveillance radar for traffic control; William Simpson of the ACC Airspace Panel will lecture on growth and problems relative to air space and future planning.

Other topics scheduled include emergency procedures, instrumentation and cockpit procedures.

EATC headquarters are in Smithtown, L. I., N. Y.

First 680 Aero Commander Goes to No. Carolina Firm

The first Model 680 Super Aero Commander was delivered to the Long Manufacturing Co., Tarboro, N. C., Aero Design & Engineering Co. has reported. Announced early last fall, the new twin-engine executive model of the series is powered by two supercharged Lycoming 340-hp engines which create a top speed of 260 mph.

The Super Aero Commander is being produced side-by-side with the Model 560 A and the company has a backlog on the two models extending into next summer. An Air Force contract for 15 Aero Commanders has been completed.

Labor difficulties delayed production somewhat, but in the past 30 days the schedule has climbed back to 10 to 11 planes a month, nearing the level of 11 and 12 planes a month last fall before the walkout.

Fletcher Builds Passenger-Cargo Version of FU-24 Agriplane

A new combination passenger and cargo configuration of the FU-24 agricultural aircraft has been announced by Fletcher Aviation Corp. of Rosemead, Calif.

The new model, using the basic airframe of the agriplane, provides facilities for carrying four passengers plus pilot or for hauling up to 1,500 lbs. of cargo. While the two rear seats are permanently installed, the two forward seats beside the pilot can be removed, folded and lashed to the back seat to make room for cargo.

Other design characteristics are identical to the FU-24, first announced 18 months ago. It has a 42-foot wing span; length of 31 ft. 10 in.; a wing area of 204 feet and a useful load of 1,630 pounds. It is powered by a Continental 225-hp. engine, cruising at more than 110 mph, with a range of 410 miles.

• **The new version** utilizes the space occupied by the hopper for seating or cargo area. The seats weigh 38 pounds and are of conventional steel tubing construction. No firm price has been announced.

The FU-24, which won formal certification by CAA last July, is one of the few planes designed from scratch for the rigorous "Ag-plane" role.

And plans by Fletcher for its use as a passenger-cargo aircraft focuses new interest in its design details.

"Being aware of the hazards is half the battle," says Fletcher project engineer John Thorp. Throughout its design the FU-24 emphasizes what Thorp calls "preventiveness." Some examples:

• **40g Cockpit**—Structural design of cockpit area permits it to withstand 60,000 pounds of stress, equivalent to the shock of flying into the ground at a 45-degree angle at 75 mph, stopping within three feet.

• **Fixed Gear**—Use of a nonretractable landing gear better adapts the FU-24 to rough field landings while its tricycle arrangement provides unhindered visibility for taxiing ("With its wide gear, rough field landings every five minutes should be no problem," says Thorp.)

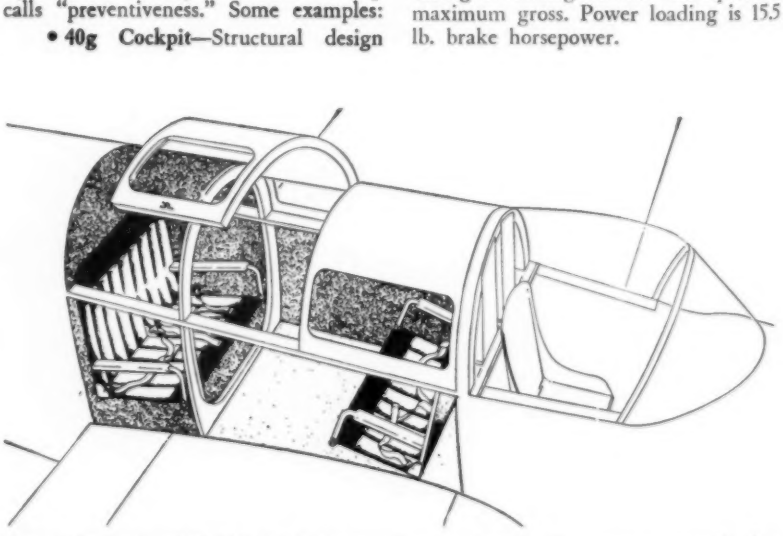
• **Engine Mounting**—Use of semi-monocoque engine structure, in which the lower half of the fuselage nose serves as the engine mount, further protects the pilot from the power plant. As an added crash barrier, the main nose wheel strut in the FU-24 is located between the engine and cockpit.

Of the overall design for safety, Thorp says "the cockpit is merely an additional safety factor. We've attempted to provide so many other preventative safety factors that the extra-strong cockpit will never be called upon to show what it can do."

Maximum gross weight of the FU-24 is 3,500 pounds, empty weight 1,909 pounds and payload 1,250 pounds.

Powerplant is the 225-hp Continental 0-470-E producing a top speed of 124 mph, cruise of 108 mph and power-on minimum speed with flaps down of 42 mph. Endurance based on 40-gallon fuel supply is 3.4 hours and range 370 miles.

Total wing area is 294 sq. ft. providing a loading of 11.9 lb. sq. ft. at maximum gross. Power loading is 15.5 lb. brake horsepower.



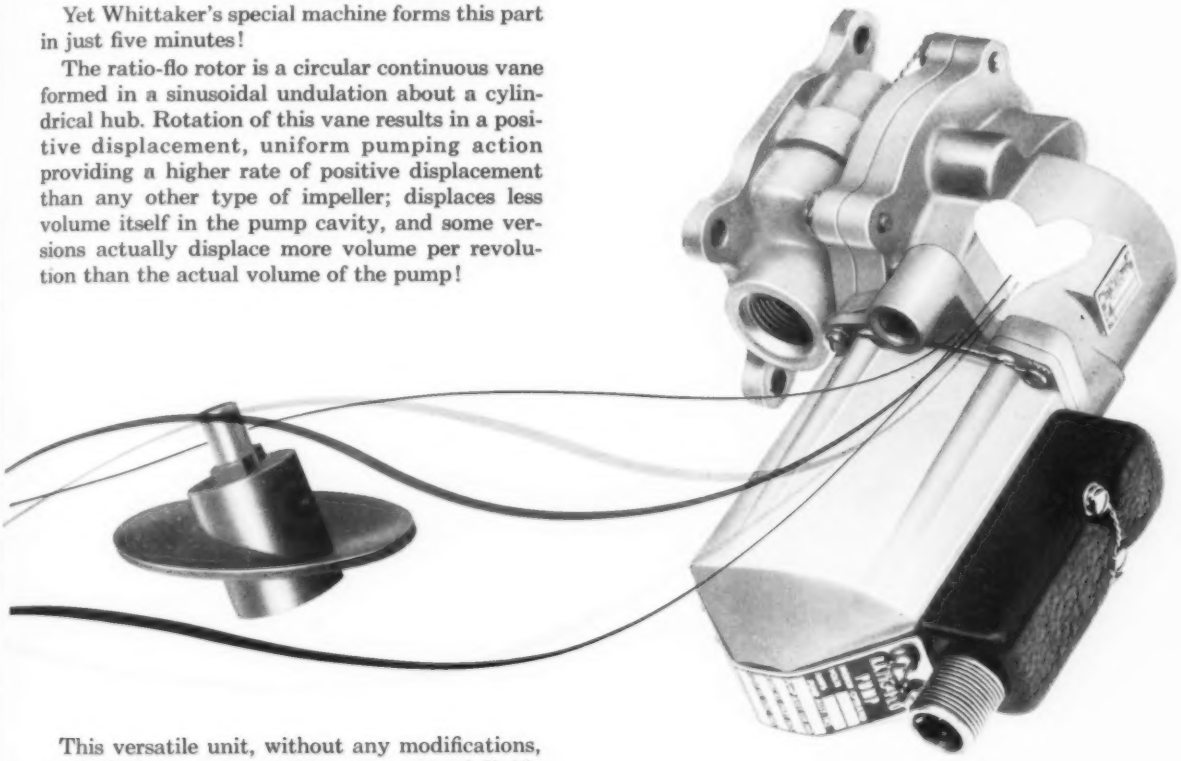
New configuration of Fletcher FU-24 for passenger or cargo-carrying purposes provides four seats and pilot's compartment. Forward seats are removable. They can be folded and lashed to back seats when plane is used for cargo.

Why Whittaker Ratio-Flo Pump has a Five-to-One Advantage

The answer is the rotor—heart of the Whittaker Ratio-flo unit. Entirely new in concept, it has convolutions almost too complicated to define.

Yet Whittaker's special machine forms this part in just five minutes!

The ratio-flo rotor is a circular continuous vane formed in a sinusoidal undulation about a cylindrical hub. Rotation of this vane results in a positive displacement, uniform pumping action providing a higher rate of positive displacement than any other type of impeller; displaces less volume itself in the pump cavity, and some versions actually displace more volume per revolution than the actual volume of the pump!



This versatile unit, without any modifications, could divide two or more flows... pump and divide two or more flows... join two or more flows... pump and join two or more flows.

Your Whittaker Field Engineer can give you detailed information about these new fuel pumps, air pumps, flow joiners and flow dividers using the ratio-flo principle. Why not get in touch with him today.

Greatest advantage of the Whittaker Ratio-Flo pump is efficiency – in all cases over 80% as against the average pump efficiency of 15%. It draws constant current regardless of pumping rate, and current requirement is only about 1/3 to 1/5 as much as with a centrifugal pump.

SEND THIS COUPON FOR COMPLETE INFORMATION!

WM. R. WHITTAKER CO., LTD.
915 N. CITRUS AVENUE
LOS ANGELES 38, CALIFORNIA

Gentlemen:
Please send me further information on Ratio-Flo Pump.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

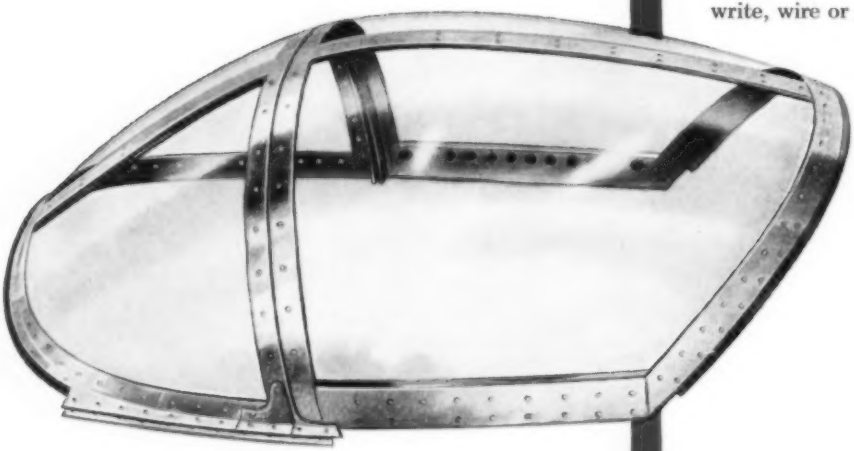
Whittaker

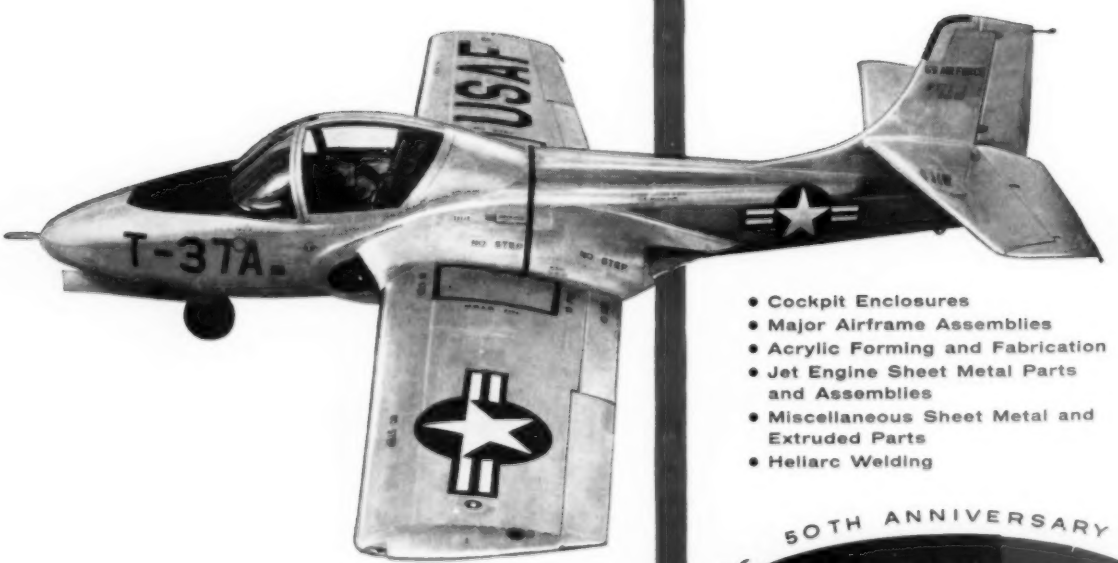
WM. R. WHITTAKER CO., LTD., 915 N. CITRUS AVE.
LOS ANGELES 38, CALIF

HEMPSTEAD, LONG ISLAND • INDIANAPOLIS
BALTIMORE • WICHITA • SEATTLE

Contributing precision-made cockpit enclosures to America's air arm

The Cessna T-37 will help to train tomorrow's jet pilots faster and at less cost. An enlarged cockpit enclosure made by Kawneer gives the instructor and trainee improved visibility. With our knowledge of acrylics and specialized facilities in our new, modern plant we are prepared to take the complete responsibility for your cockpit enclosure program. Our forming, routing, edging, optical testing and glazing to metal facilities are available to produce any part of your cockpit enclosure—from the acrylics only to the complete assembly—write, wire or phone.





- Cockpit Enclosures
- Major Airframe Assemblies
- Acrylic Forming and Fabrication
- Jet Engine Sheet Metal Parts and Assemblies
- Miscellaneous Sheet Metal and Extruded Parts
- Heliarc Welding

50TH ANNIVERSARY
Kawneer
General Offices
NILES, MICHIGAN
AIRCRAFT PRODUCTS DIVISION
1906–1956

Write for new Kawneer Aircraft Products books for complete description of facilities.

Engineers: Kawneer offers excellent opportunities for growth and advancement. Bring your family to Niles and enjoy vacationland living. Work in new, modern facilities.

Circle No. 19 on Reader Service Card.

TRANSPORT TRENDS

Washington, D. C., April 9, 1956

BAD WEATHER HIT AIRLINES HARD in northeast U.S. during first quarter of 1956. Air traffic control delays added to troubles. Northeast Airlines completed only 74% of scheduled miles in March, lowest in eight years. Allegheny suffered; some stations weren't served for 14 consecutive days. American's short-haul operations dropped to 89.2% in March. Capital canceled 300,000 miles in the same month. Lost revenue total will be substantial.

●

USED TRANSPORT PRICES ARE HIGH. DC-4s have sold recently for as high as $650,000. DC-3s have been quoted up to $150,000. Reason: tight equipment situation. High prices have aroused local service lines' interest in Navy plan to offer 23 DC-3-type planes for lease. CAB will be asked to set lease price. Navy is expected to accept CAB figures.

●

JET ENGINE PRICES are running three to five times higher than piston models. Pratt & Whitney's J57 costs $145,000; J75 runs $215,000. And manufacturers recommend three spares per plane for "quick change" backstopping in case of mechanical trouble. Result: J57-powered transport's engines cost $580,000 ($1,015,000 with spares). J75 figures are $860,000 and $1,505,000.

●

AIRLINES ARE NEAR AGREEMENT on a code of practice covering liquor service aloft. Air Transport Association directors discussed principal points: ATA staff is drafting the code for consideration of airlines affected (TWA, American, United, Eastern, National, Northwest). Some controversial items will be eliminated.

For example, there'll be no rule requiring a charge for drinks. Lines serving champagne, wine or beer, such as Western, won't be covered. Neither will U.S. international operations. There will probably be a statement that, in general, a two-drink limit will apply, although some flexibility may be allowed. Liquor discussion at ATA meeting was amiable, with little disagreement. No one favors discontinuing drinks. Persons answering UAL's questionnaire on the subject reportedly voted overwhelmingly in favor of liquor service.

●

LOOK FOR SETTLEMENT of Tacan-VOR/DME controversy by summer. And Cabinet-level officers say flatly that Air Coordinating Committee—and no one else—will set policy on the short-range navigation system. They're irked by efforts of various parties to push their pet solutions. ACC will start deliberations by mid-May. Latest rumored compromise was to convert all DME ground stations to low-powered Tacan-type distance measuring system. But this is only one possibility. ACC will explore all areas thoroughly.

●

OF GREAT IMPORTANCE to local service lines are "capital gains" bills pending in Congress. At present, if a carrier sells capital equipment, CAB counts the money as "other revenue" when setting subsidy and deducts it from "need." Bills would prohibit this if money is to be reinvested in other capital equipment. Local lines, on the threshold of buying newer planes, need the legislation to cover money from sale of DC-3s. They're pushing the bills. CAB is cool to the idea. General Accounting Office may fight it.

PARTNERS IN PROGRESS . . .

EASTERN

AND TWA

Eastern Air Lines—TWA interline partner—provides TWA passengers with fast, comfortable service throughout southeastern U.S. and to Puerto Rico.

Flying north from Texas and the Southeast to make TWA connections to Europe, Africa and Asia, or traveling south to sunny Florida and Puerto Rico? Enjoy the speed and luxury of Eastern Air Lines' Great Silver Fleet–DC 7's, Constellations and Martins.

Eastern and TWA have enjoyed an interline partnership for many years, with TWA connections at Chicago, St. Louis and New York. TWA welcomes this opportunity to congratulate Eastern Air Lines on its fine record of outstanding service to the traveling public.

Fly the finest... **FLY TWA**

TRANS WORLD AIRLINES

U.S.A. • EUROPE • AFRICA • ASIA

CAB May Be Forced to Conduct Fare Probe

Celler committee orders Members to testify on charge Denny admitted changing vote in 1953 to kill passenger investigation.

By WILLIAM V. HENZEY

THE Civil Aeronautics Board, with its dignity at half-mast, may be forced by a House Congressional subcommittee to institute a general passenger fare investigation.

It may also be forced to reconsider, modify or withdraw its approval of numerous agreements affecting domestic and international scheduled and nonscheduled airlines alike. Such enforced action is not only possible but entirely likely.

Perhaps of equal significance, however, are the indignities to which the individual Board Members have been submitted, partly of their own making, and partly as the inevitable targets of a shotgun approach which was bound to turn up a scapegoat or two as sacrifices to election year politicking.

• **The Congressional group** which has so rocked the industry and its Federal regulatory agency is the monopoly subcommittee of the House Judiciary Committee headed by Rep. Emanuel Celler (D-N.Y.). The subcommittee consists of seven members—four Democrats and three Republicans.

Celler and subcommittee counsel Herb Maletz feel they have something and have the support of the other three Democrats in their unprecedented attack on CAB. The Republicans, led by Rep. Richard Keating (R-N.Y.) charge it all up to politics.

Members Ordered to Testify

So serious is the attack that for the first time in history CAB Members have been ordered to testify under oath. So complex did the investigation become after that directive that two Members risked contempt citations on at least 16 occasions by refusing to answer questions.

There are numerous instances of conflict in testimony if not outright perjury. In fact the subcommittee expects to meet to weigh the possibility of turning perjury charges over to the Department of Justice.

• **CAB itself** has adopted an unusual resolution directing its Members and staff officials not to answer Congressional questions relating to remarks made by Board Members at an April 23, 1953 private Board meeting.

One former CAB Member has come out of the past to testify openly as to matters which present CAB people are prohibited from discussing.

Behind the entire investigation, either directly or indirectly, is the North American Airlines group which has charged that a "conspiracy" between CAB and the scheduled industry has kept them out of the certificated field.

• **The Celler hearings** opened with a splash early last month when CAB Chairman Ross Rizley, Vice Chairman Joseph P. Adams and staff officials were unwilling or unable to explain the absence of a fixed mathematical standard by which the Government prevents "excess earnings" in the airline industry.

The immediate target of that attack became the 1953 Board meeting at which then-new CAB Member Harmar D. Denny switched a vote cast 13 days earlier to join a 3-man majority which dismissed a pending general fare investigation.

Denny was not at that opening meeting but was ordered to appear the following week. When he did, he was asked if he had not been influenced into changing his vote by Stuart G. Tipton, then counsel and now president of the Air Transport Association.

Tipton met with Denny in the latter's CAB office sometime between the two votes on the fare investigation. Denny admitted the meeting but denied either that he was influenced by Tipton in his vote or that the fare case was discussed at the meeting.

Celler then turned to Adams and asked if Denny told the Board at the April 23 meeting that he was visited by Tipton and, in effect, was changing his vote as a result of that visit. Adams, who in 1953 had voted to continue the fare investigation, declined to answer since Denny himself was before the subcommittee and could so answer.

Adams Directed to Answer

• **Celler wasn't satisfied** and "reluctantly" made Adams stand up and take the oath, marking the first time a CAB Member has been put in that

TWA Moves to New $25-million Overhaul Base

Trans World Airlines' new $25-million overhaul base near Kansas City became operational this month. John Collings, executive vice president, is shown cutting ribbon to start engines rolling onto continuously moving production line. At left is Ray Dunn, director of engineering and maintenance, and right, Frank Busch, general operations manager. Engine shop employs nearly 1,000 persons.

position. Though under oath, however, Adams still declined to answer. Celler said: "I direct you to answer."

But at that point, Adams and Rizley were given a "few days" to weigh the Board's position.

On the afternoon of March 20, the Board voted to adopt a legal memorandum prepared by CAB General Counsel Franklin M. Stone which upheld the Board's right of privilege as to its private meetings. It also adopted the resolution mentioned above.

• **On the morning** of March 22, in an atmosphere of heavy tension, Chairman Rizley, Vice Chairman Adams, Member Denny and Member Chan Gurney (just returned from England) appeared before the subcommittee.

Denny was sworn in first. He was asked by Rep. James M. Quigley (D-Pa.) about the fateful April 23, 1953 meeting. Denny said he could not answer in view of the Board's recently-adopted resolution. When Chairman Celler directed him to answer, the Republican contingent on the subcommittee intervened.

Keating termed the entire procedure "fantastic, preposterous, and sinister." He assured Denny and other Board officials that neither the committee nor the Congress would ever vote for contempt if he declined to answer. Rep. Hugh Scott (R-Pa.) and William M. McCullough (R-Ohio) joined in Keating's assurances.

But Celler said he thought the CAB resolution to be "self-serving" and that answers were required by the public interest. He got a 4-3 vote of his subcommittee to continue. Nine times Denny was directed to answer and nine times he refused.

Another committee member, James M. Quigley (D.-Pa.) then turned to Adams and six times got the same result—no answer.

Josh Lee Surprise Witness

But the subcommittee turned up a surprise witness—Josh Lee, former U.S. Senator from Oklahoma and 13-year veteran of CAB whose tenure there ended last December 31. Lee, a Democrat, said he was "reluctant" to testify and "begged the committee not to force him." Keating and the other Republicans gave him definite assurances that no contempt action would be voted against him if he refused to talk.

CAB counsel Stone privately told Lee he was covered by the Board's resolution and need not answer.

• **But Lee decided to talk.** He told of the April 23, 1953 meeting and that Denny related to the Board his visit from Tipton and events surrounding the resulting Board vote. He was not asked, however, nor did he volunteer an answer to the question which produced the unprecedented situation, namely, whether Denny told the Board he was influenced by Tipton.

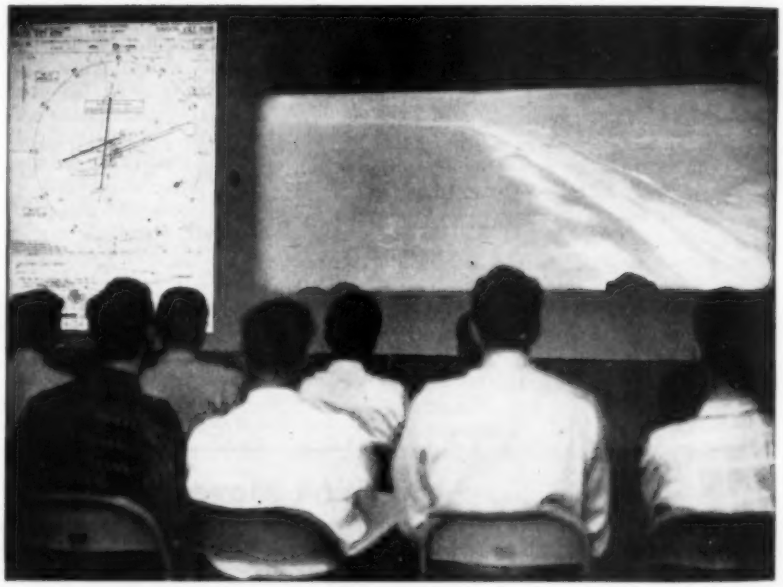
The subcommittee then produced one of columnist Drew Pearson's aides who related his version of a telephone call to Denny in mid-May, 1953 which, according to the aide, confirmed material he had for a story about Denny switching as a result of the Tipton visit. Denny disagreed with the testimony, but the hearings were terminated by Celler.

The investigation is slated to be resumed about April 11 and one of the key witnesses to appear will be Tipton. Meanwhile, there were reports at press-time that Celler was considering some form of action against Denny, although the existence of an incomplete record argued against it.

There are no indications how long the hearings will run. But a strongly-worded subcommittee report is almost certain and even the most optimistic industry officials look for nothing less than a directive for the Board to reinstate the fare investigation.

Also slated for Board action are the Air Traffic Conference and International Air Transport Association resolutions which make "licensing authorities" of those groups with respect to travel agents. ◆◆◆

How PAA Uses Movies to Train Pilots for Pacific-Alaska Routes



PILOTS IN CLASSROOM—Those Pan American captains are watching a motion picture of approach to an airport in Orient as part of new type of route familiarization program started by company's Pacific-Alaska division at San Francisco.

A new system of pilot route qualification, built around the use of motion pictures which show the surrounding terrain and approach and landing paths of various airports, is now being used by the Pacific-Alaska division of Pan American World Airways at its San Francisco base, with CAA approval.

Before this system was approved, it was necessary for a PAA captain to make two one-way trips over the route and make a landing at each airport—all with a check pilot—before he could fly a scheduled trip over that route. The new program, Chief Pilot S. T. Peters estimates will save $40,000 annually, plus valuable pilot time.

PAA also believes the pilot gets a more thorough check-out with the new program than he would if he actually flew the route, because he can concentrate exclusively on the motion pictures without the distracting job of having to fly the airplane.

• **The movies** are accompanied by a magnetic sound track, with the commentator pointing out the various terrain features and let-down procedures. A regular check pilot, using a type of slide known as a Vu-Graph, covers operating procedures and approach procedures at individual airports and a meteorologist lectures on weather conditions en route and at airports.

When the project was started Capt. Murray Stuart, assistant chief pilot in charge of training, and Photographer Jack Rice were assigned to "shoot" approaches to Saigon, Singapore and Bangkok. A 16 mm. Arriflex camera with a Bell and Howell Filmorana

anamorphic lens, giving a wide angle field, was mounted in the nose of a twin Beech owned by the CAA. Arthur (Skip) Jenkins, CAA agent at Bangkok, piloted the aircraft, Rice handled the camera and Capt. Stuart directed the project.

The results were so satisfactory that the division has purchased its own camera and has mounted it in the cockpit of one of its trans-Pacific Boeing 377s to make movies on regularly scheduled flights. Eventually, with CAA approval, the motion pictures will be used to cover all Pacific airports where PAA operates.

Strike Cost WAL $5 Million in Revenue

One of longest disputes in air transport history (63 days), it also cost workers about $2 million in wages.

By FRED S. HUNTER

The Western Air Lines Strike, one of the longest in air transport history, probably cost the company close to $5 million in revenues and workers about $2 million in wages.

Duration of the strike by the Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express and Station Employes (AFL) was 63 days, but it took an additional 11 days to set up machinery to restore service. Then, 10 days more passed before WAL completed full resumption of all schedules over its 5,525-mile system in 12 states and Canada. Total: 84 days, from January 9 to April 1.

• **The issue** prolonging the BRC strike was that of the union shop, demanded by the union. Said Terrell C. Drinkwater, WAL president, refusing: "We support the American principle of freedom of choice and believe that our employes must have the right, but must not be compelled, to join any union."

When the union withdrew its demand for a union shop, agreement on terms for a new contract was quickly reached; the strike called off. Workers in the BRC bargaining unit were given wage increases averaging approximately $30 a month.

Pilots Involved, Too—

• **Significantly,** the BRC strike took place in front of a backdrop first set up by the Air Line Pilots Association in its negotiations for a renewal of its contract which had expired in May, 1955. Dissension had arisen over a supplemental pension asked by the pilots and the ALPA had announced its own plans to strike if its demands were not met.

The BRC merely happened to strike first. This circumvented an actual strike by the pilots by causing WAL to suspend operations and furlough a majority of its employes, including all flight crews.

• Since WAL had to have its pilots signed up to put its aircraft back into the air, disposition of their dispute became even more important than the settlement of the BRC strike in WAL's restoration of service. Moreover, the pilots' pension issue had greater fundamental significance.

• **Terms** of the new agreement WAL ultimately reached with the ALPA illustrate the increased importance pilots are attaching to provisions for pensions as compared to immediate wage increases. The WAL agreement, which runs until October 1, 1957, provides for a modest 2% wage increase—an average of 40¢ an hour by ALPA figures—retroactive to May 1, 1955, the date on which negotiations began.

This made the determining factor in WAL's settlement with the pilots the establishment of a supplemental pension plan of the variable annuity type, to provide retirement benefits over and above the benefits payable under WAL's retirement program for all employes.

Under the terms agreed upon, eligible members of WAL's group of 257 pilots who elect to participate in the program will contribute 2% of their monthly gross earnings while the company will contribute 2% of the total gross earnings of all participating pilots. Contributions of both parties will be increased to 3% on October 1, 1957.

According to Howard Jones, western regional representative of the ALPA, the new retirement plan which supplements the insured retirement plan already in effect at WAL, will produce additional retirement income at age 60 of $2,171.47 per year for the average pilot now flying the line. The amount will be considerably more for younger pilots.

Retirement Provisions

• **To be eligible** for participation in the variable annuity trust program, pilots must participate in WAL's basic retirement plan, which is available to all employes. This plan, adopted in 1952, provides for a retirement age of 60 for pilots and of 65 for all other employes. Because of the earlier retirement age, pilots contribute 8% of their earnings while the company pays 4%. Other employes pay in 6% and the company 3%.

WAL illustrates the benefits to be derived from participation in its basic retirement plan by citing the case of a pilot with earnings of $1,221 per month. This pilot, now 41, entered the plan in 1952, when it was originated, at age 37. His retirement income, starting at age 60, will be $5,500 annually. A co-pilot, hired now at age 28, would have a retirement income of $8,000 per year.

The ALPA points out that income derived from the supplemental plan effective April 1 will increase in value commensurate with the rise in the national economy because it will be invested in variable type annuities. This will maintain the normal purchasing

Compact Turboprop Refueler

Truck-tank for refueling Capital Airlines' Viscount was built by Mack Trucks, Inc. exclusively for Shell Oil Co. Tank has capacity of 5,100 gallons. Truck has short turning radius, large windshield and door windows, is said to be most compact vehicle of its type.

American Aviation Publications

1025 Vermont Avenue Northwest Washington 5, D. C.

Telephone STerling 3-5400 • Cable AMERAV

Correction. As of April 16th our new address will be 1001 Vermont Avenue, Northwest Washington 5, D.C. — Telephone remains the same Sterling 3-5400

American Aviation Publications has taken over the entire 8th floor of 1001 Vermont Avenue, Northwest, Washington to house its main executive, editorial, circulation and business management departments.

This represents the fifth expansion move made by American Aviation Publications, to better serve the aviation industry, since the company began in 1937.

You are cordially invited to stop in, whenever you are in Washington, to see these new offices and visit with us.

Wayne W. Parrish

Wayne W. Parrish
Editor and Publisher

power of the original insured type retirement plan, which provides fixed benefit payments.

• **Pilot interest** in bigger and better pensions stems from two sources. The first, of course, is the earlier compulsory retirement age of 60. The five years between 60 and the normal retirement age of 65 cost a lot of money, either in higher premium payments or lower retirement returns. But also important are the tax benefits to be derived by sidetracking part of a wage increase into added retirement income. Pilots, by and large, are in income tax brackets where the bite on a current wage boost is substantial. It's appreciably less on a raise deferred to the years of retirement.

Added retirement benefits, it might be explained, are counted by the company as an increase in compensation. WAL, for example, puts the increase in pay to pilots in the new contract at 4%, although only 2% (less taxes) goes into the pilots' pockets now. The other 2% goes into the supplemental retirement fund.

• **The ALPA** now has variable annuity pension agreements, in one form or another, with American Airlines, Delta Air Lines, Northwest Airlines, TWA, United Air Lines and Pan American World Airways. Its agreement with WAL represents a start among the secondary carriers. That it intends to pursue a similar pension course with all airlines is evidenced by the fact that a retirement plan of variable annuity type is a demand it has made in negotiations with The Flying Tiger Line, a cargo carrier, now in mediation.

WAL has put out no estimates of the cost of the strike, and President Drinkwater says it will not do so until it can compile exact numbers. But rough guesses have put the loss of revenue at something less than $5,000,000 and the loss of wages to workers at about $2,000,000.

BRC members made up part of their loss with $30 weekly strike benefits and the cost of these to the union has been put at around $80,000. Because of the peculiar circumstances, the ALPA also paid strike benefits even though technically the pilots were not on strike, but were furloughed by the company.

Mitigating Circumstances

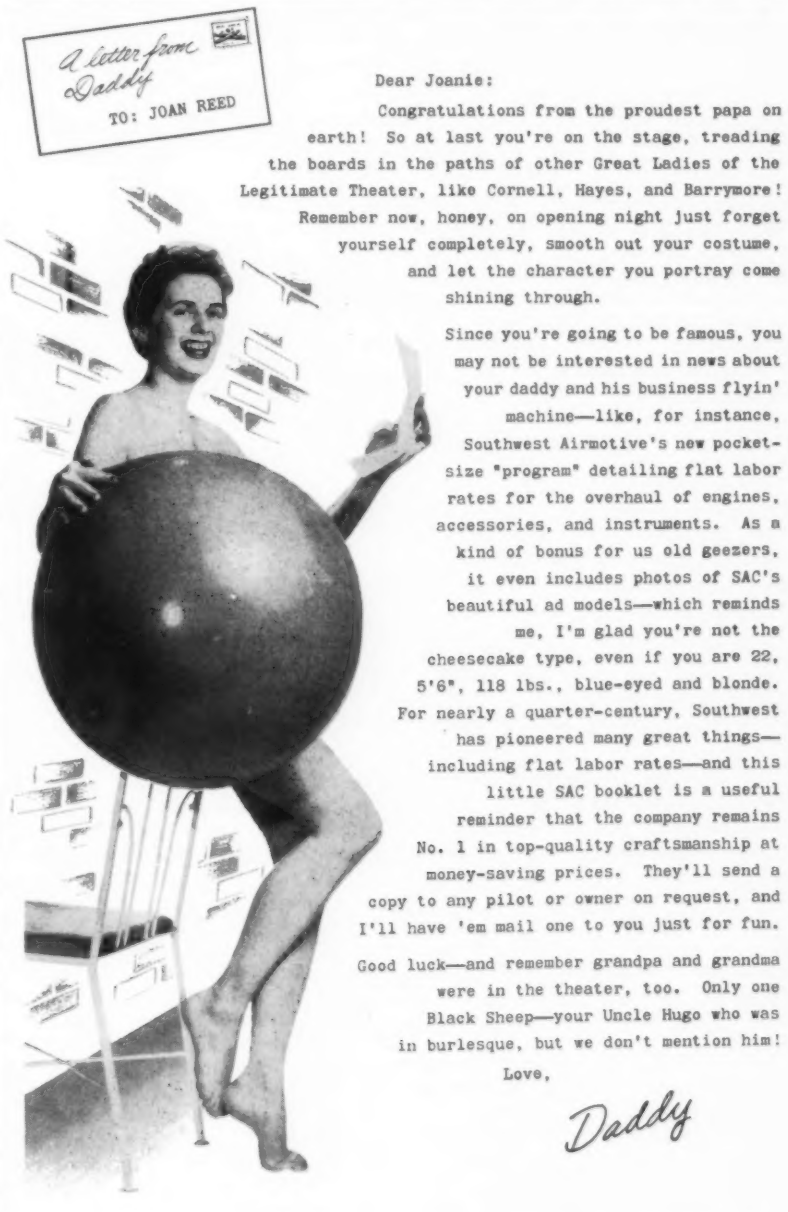
• **Net cost** to the company and its stockholders was softened by a number of circumstances. In the first place, WAL lost no time in reducing expenses after it suspended service. It acted immediately to get its payroll down, and had only 411 employes left on the lists when the strike was settled as compared to 2,130 just before it was called.

WAL sold three DC-4s, one each to Alaska Airlines, American Airlines and Sabena, and one DC-3 to Piedmont Airlines during the course of the strike, for a substantial capital gains profit. In a letter to stockholders, President Drinkwater pointed out that WAL has 13 Douglas DC-6Bs on order, with six scheduled for delivery this year and seven in 1957. The 1956 deliveries will begin in May, when WAL's heavy travel season starts. At the time these aircraft were ordered over a year ago, Drinkwater said it was the intention ultimately to dispose of the non-pressurized coach DC-4s. Since the market for this type of plane currently is strong, WAL took the opportunity to sell them at the high prices. WAL also sold four spare R2000 engines to North American Airlines.

WAL's financial recovery also will be expedited by the fact that the strike, in the low traffic season of the year, set back the overhaul period on some of its DC-6B equipment just long enough to take it out of the heavy summer traffic period. This means WAL can now count on having its full DC-6B fleet in operation throughout the peak travel period with no loss of seats to the overhaul shop.

• **In other words,** despite the long strike, WAL can still be expected to have one of its better years financially.

Getting back into business turned out to be a man-sized chore because of the long duration of the work stoppage.


A letter from Daddy
TO: JOAN REED
Dear Joanie:
Congratulations from the proudest papa on earth! So at last you're on the stage, treading the boards in the paths of other Great Ladies of the Legitimate Theater, like Cornell, Hayes, and Barrymore! Remember now, honey, on opening night just forget yourself completely, smooth out your costume, and let the character you portray come shining through.
Since you're going to be famous, you may not be interested in news about your daddy and his business flyin' machine—like, for instance, Southwest Airmotive's new pocket-size "program" detailing flat labor rates for the overhaul of engines, accessories, and instruments. As a kind of bonus for us old geezers, it even includes photos of SAC's beautiful ad models—which reminds me, I'm glad you're not the cheesecake type, even if you are 22, 5'6", 118 lbs., blue-eyed and blonde. For nearly a quarter-century, Southwest has pioneered many great things—including flat labor rates—and this little SAC booklet is a useful reminder that the company remains No. 1 in top-quality craftsmanship at money-saving prices. They'll send a copy to any pilot or owner on request, and I'll have 'em mail one to you just for fun.
Good luck—and remember grandpa and grandma were in the theater, too. Only one Black Sheep—your Uncle Hugo who was in burlesque, but we don't mention him!
Love,
Daddy
SOUTHWEST AIRMOTIVE CO. • LOVE FIELD • DALLAS, TEXAS
Circle No. 11 on Reader Service Card.

Sample: WAL scheduled 120 hours of Link time in 10 days at Los Angeles. Pilots were given refresher courses and check flights before going back into schedule. All planes were inspected and flight tested.

Part of the settlement entered into with the BRC covered the payment of retroactive pay of $18.50 a month back to July 1—or about $150 per worker. This was paid on March 19 at which time all workers in the bargaining agency were instructed to report for work. A provision of the agreement, however, permitted any workers not needed to be furloughed. About 80% were furloughed, to be called back from day to day over the ensuing 14-day period to April 1 when the full compliment of 71 schedules daily was to be in operation.

Although practically any WAL worker, dispossessed from his job by the strike, could have gotten another one simply by walking across the street, and some did, terminations in key spots were even less than expected. The total, it was estimated, would not exceed 200.

Final settlement of WAL's first quarter labor problem had a third side. WAL wrapped up a new contract with the International Association of Machinists representing the company's mechanics. Like the BRC, the IAM withdrew demands for a union shop and also for checkoff of dues. This new agreement, to January 1, 1958, provides for a wage boost of 9¢ an hour retroactive to October 21, 1955, the date of the start of negotiations, plus an additional 9¢ effective November 1. ◆◆◆

How Convair Rates Its Medium-Range Jet

By FRED S. HUNTER

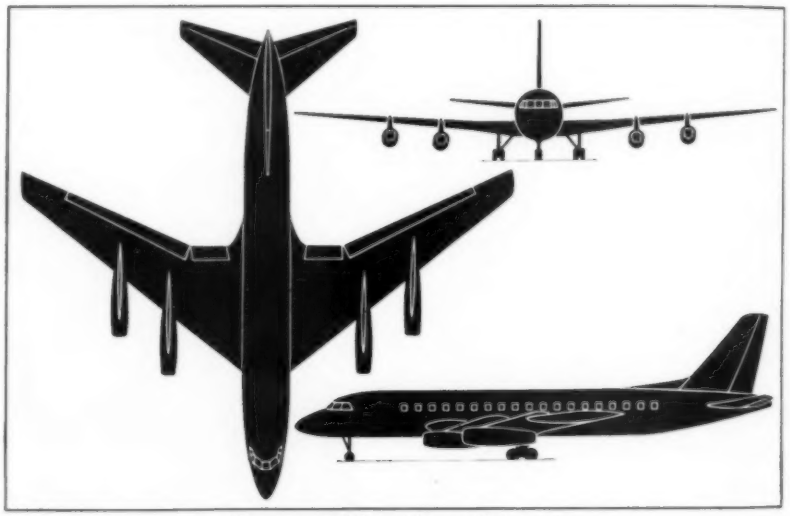
Even though the Convair Division of General Dynamics Corporation is making its entry into the gas turbine transport competition after more than 300 orders already have been placed with other companies, it expects to see its projected medium-range turbojet win a share of the market both among domestic carriers in this country and those abroad.

Convair has named its new turbojet the Skylark 600.

"We think this is the right airplane," said J. G. Zevely, director-contracts and sales.

An 80-passenger, four-jet transport designed to operate from 5,000-foot runways, the new transport will operate at cruising speeds up to 580 mph. Convair calls it the "fastest commercial airplane in the world."

The San Diego manufacturer had no advance orders at the time it announced the new jet. But any combination of orders for 40 aircraft will permit it to go ahead with production plans.



Three views of Convair's new Skylark 600.

Zevely Is Optimistic

•**Despite the fact** that the cream may have been skimmed from the top of the market by the more than 300 sales by the other companies, Zevely feels Convair has prospects for the required initial orders. A number of carriers have not yet completed their equipment commitments. Within the industry, Howard Hughes, for TWA, is generally regarded as the best bet for an early order.

After a couple of false starts, Convair became the 4th U.S. manufacturer to enter the gas turbine transport lists through the availability of a new engine, General Electric's CJ-805, commercial version of the GE J79. This is a lightweight, single-spool engine, with a low frontal area and a number of advanced features. It reportedly has superior specific fuel consumption. The engine's thrust is classified, but it's a good guess a derated commercial version will come out in the area of 10,000 pounds.

One other advantage of the CJ-805 will be its military experience. It is going into six different Air Force and Navy aircraft, one of which, incidentally, is Convair's own XB-58 supersonic bomber. Another is Lockheed's highly-touted F-104, in which a 50-hour version of the engine already is in flight test.

Taking the new engine, Convair produced a turbojet design with low wing-loading, primarily for the market occupied by turboprops like the Vickers Viscount and Lockheed's forthcoming Electra, but crossing over into the field previously reserved for the big jets, like the Boeing 707 and the Douglas DC-8, on the basis of its high performance, Convair points out, for example, that its short-field jet will at the same time show a block speed of 15 mph faster than the bigger jets for a flight of 2,500 miles.

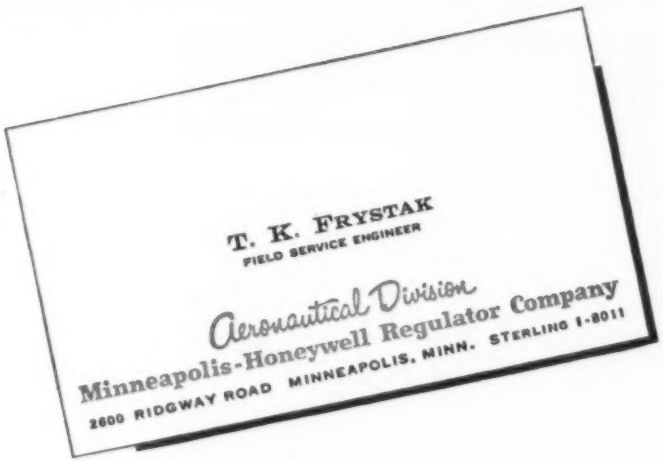
• **Pictorially,** the Skylark 600 looks like a smaller edition of the Boeing 707 or the Douglas DC-8. Wing, horizontal stabilizer and rudder are swept back at a 35-degree angle. Four wheels are used in each of the two main landing gear trucks and nose gear is a double wheel. The four jet engines are mounted in individual pods beneath the wing.

Large Wing Area

To provide the lift for short-field takeoffs and landings, the wing is big. Wing area of 2,000 sq. ft. is produced by the span of 118 ft. 4 in. This large wing area provides the space for 70,000 lbs. of fuel, or enough for nonstop coast-to-coast operation, although a better operating range would be one stop.

Similarly, the Convair jet is designed structurally for a maximum gross takeoff weight of 170,000 lbs., but the performance takeoff weight for a typical flight from Chicago to Los Angeles would be 152,500 lbs.

On such a flight the 80-passenger plane will be able to take off with a full



Ted Frystak is one of more than 100 Honeywell Field Service Engineers. Consultants, teachers, and engineers, these men live with the Honeywell precision control systems wherever they fly in all operating theaters of the Navy and Airforce. Their suggestions for new controls, new applications, new modifications help Honeywell meet the fast-changing demands of modern aviation.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

Circle No. 20 on Reader Service Card.

NORTH AMERICAN'S Columbus Division

Offers A New Challenge To EXPERIENCED ENGINEERS

You can share in a new kind of career challenge . . . if you have experience and vision. Here's the story briefly:

North American's Columbus Division has prime responsibility for the design, development and production of North American's Naval airplanes. The Division is young, with the highly-successful FJ-4, a "concept-to-flight" Columbus Division product, as evidence that its engineering team is "going places."

Young organization . . . greater Individual Opportunity for you.

You are sure of . . . Stability . . . North American Aviation is the company that has built more airplanes than any other company in the world . . . Promise . . . the availability of positions for experienced engineers comes only from success.

A SELECT FEW POSITIONS ARE OPEN IN EACH OF THESE FIELDS:

Aerodynamicists, Thermodynamicists, Dynamicists, Stress Engineers, Structural Test Engineers, Flight Test Engineers, Mechanical and Structural Designers, Electrical and Electronic Engineers, Wind Tunnel Model Designers and Builders, Power Plant Engineers, Research and Development Engineers, Weights Engineers.

For The Full Story On Your Ohio Future, Write Today: Mr. J. H. Papin, Personnel Manager, Department 56 AA North American's Columbus Division, Columbus 16, Ohio.

Engineering Ahead for a Better Tomorrow

NORTH AMERICAN AVIATION, INC.

*Reg. U.S. Pat. Off. COLUMBUS DIVISION

Convair Jet Specifications

Wing Area	2000 sq. ft.
Wing Span	118 ft. 4 in.
Overall Length	118 ft. 5 in
Overall Height	35 ft. 2 in.
Wing Sweepback	35 degrees
Max. Takeoff Gross Weight	170,000 lbs.
Zero Fuel Weight	100,000 lbs.
Max. Landing Weight	115,000 lbs.
Operating Weight Empty	72,600 lbs.
Fuel Capacity	70,000 lbs.
Number of Passengers (Coach)	99
Number of Passengers (First-Class)	80
Payload (Coach)	22,835 lbs.
Payload (First-Class)	19,700 lbs.
Cargo Capacity (2 lower compartments)	850 cu. ft.
Cruising Speed	580 mph

payload after a run of only 4,000 ft., cruise the 1,751 miles to Los Angeles at 35,000 ft., against a 50 mph. headwind, and still have fuel to fly 200 miles at 25,000 feet to an alternate airport, and hold at 15,000 ft. above the alternate for one hour.

From zero to 1,750 miles in range, no performance penalties are invoked by hot day operations, Convair says. Only by combining a hot day with high altitude, as in Denver or Salt Lake City, will there be any necessity for reducing the takeoff limit.

•**Payload** in the standard fare configuration of 80 passengers in four-abreast seating will be 19,700 pounds. Coach payload, 99 passengers with five-abreast seating, will be 22,835 pounds.

Preliminary studies put the direct seat-mile cost curve at 2.4c for 200 miles; 1.8c at 55 miles, 1.6c at 1,000 miles and 1.15c at 1,500 miles. Breakeven passenger only load factor on a Los Angeles-San Francisco flight is estimated at 68%; between New York and Washington 75%.

Convair is offering its Skylark 600 to airlines for deliveries starting early in 1960 at a basic price of approximately $3,300,000 each. This, however, can be expected to increase some because of labor escalator provisions.

•**The fuselage** is 118 ft., 5 ins. long, and the top of the vertical fin will be 35 ft., 2 ins. above the ground when the plane is resting on its tricycle landing gear. Two cargo compartments total 850 cu. ft. of space. Fully pressurized and air conditioned, the passenger cabin will be maintained at the 8,000-ft. level when the aircraft is flying at an altitude of 40,000 ft. Most economic cruising altitude, however, will be 35,000 ft.

But for short runs, the CJ-805s

Convair Asks CAA For Jet Approval

Some measure of the priority being placed by Convair on all development phases of the Model 22 four-jet transport are evident in the speed with which formal request for CAA certification has been processed. Official bid was filed with CAA on March 15, a full three weeks before public disclosure of the new design.

can still be operated within well-defined economic limits at lower altitudes, Convair reports. For a 54-minute flight between San Francisco and Los Angeles, for example, the top cruising altitude would probably be 23,000 ft.

Happy Partnership

Convair is extremely happy in its partnership with General Electric as a result of the engine manufacturer's cooperation on engine warranties and service. GE will guarantee parts costs to airlines and also provide estimated labor costs for overhauls. GE is taking prime responsibility for the development of a noise suppressor and a reverser for application to the CJ-805 engines in the Convair plane. Convair engineers will work with the GE engineers on these devices.

In addition to U.S. domestic carriers still requiring turbine-powered equipment, Convair expects that its jet will fit the picture for various European operators for their routes within Europe and also those extending to Africa and Asia. Typical U.S. routes where Convair feels its jet transport will fit are as follows:

Route	Distance	Schedule Time
Chicago-Kansas City	405 miles	50 min.
Chicago-New York	724 "	1 hr., 30 min.
Los Angeles-Seattle	957 "	1 hr., 50 min.
Chicago-Miami	1,181 "	2 hrs., 20 min.
San Francisco-Chicago	1,856 "	3 hrs., 40 min.

Transport Briefs

• **Legislation** authorizing federal participation in design and development of prototype aircraft for local service lines has been introduced by Rep. Carl Hinshaw (R.-Calif.). The bill (H.R. 10071) authorizes a $25-million appropriation, not more than half of which could be spent for any one project.

• **TWA** ordered track-mounted seats for eight 1049G Super Constellations and 24 Model 1649 Connies from TECO, Inc., Burbank, Calif.

ACTUAL SIZE
RESOLVER
TRANSMITTER
RECEIVER
DIFFERENTIAL
cppc
FOR AC SYSTEMS SPECIFY CPPC SYNCHROS
Where ACCURACY SIZE WEIGHT RELIABILITY Count Most
Let Clifton Size 8's take the place of larger synchros at very significant savings in weight and bulk, yet at no sacrifice in accuracy or reliability.
In airborne equipment, why load on unnecessary weight?
By the early introduction of our Size 8 Synchro Series, we figure to have saved the Air Arm 1 Ton of dead weight in 1956 alone.
Samples from stock, quantities from the production line.
Write for complete electrical data.
cppc SIZE 8 SYNCHROS
ACCURACY 7 MINUTES
WEIGHT 32 GRAMS
LOOK TO
cppc
FOR SYNCHRO PROGRESS
CLIFTON
PRECISION
PRODUCTS CO., INC.
CLIFTON HEIGHTS, PA.

Circle No. 21 on Reader Service Card.

TENTH ANNIVERSARY

Strategic Air Command

America's FORCE FOR PEACE

Teamwork and coordination are the keynotes of SAC, its officers and men of every rank—from airmen to commanding Generals. Pilots, co-pilots, observers, crew chiefs . . . technicians, mechanics . . . clerks, administrators, supply men . . . all are carefully chosen, highly trained specialists whose pride in their Command welds them into a tremendous force for peace. They are masters of their jobs. SAC has won the international respect of military experts for its handling of complex global operations under a single highly developed central control.

Curtiss-Wright joins all America in saluting the Strategic Air Command on its Tenth Anniversary as guardian of America and of world freedom.

CURTISS-WRIGHT
CORPORATION • WOOD-RIDGE, N. J.

YOUNG MEN! JOIN THE U. S. AIR FORCE

Investigate Career Opportunities at your Nearest Recruiting Office

Airline Commentary

By Eric Bramley

An airline hostess, especially a cute one, has to expect to get pinched now and then by a playful passenger. It's an occupational hazard. But it's getting so that a gal ain't safe anytime. Trans-Texas Airways recently had a charter flight carrying 24 preachers. And as the hostess was walking up the aisle (you guessed it) she was pinched on the south side while traveling north. All the preachers looked so pious when she turned around that she never discovered the culprit. Anything can happen in Texas.

* *

Airborne radar is a wonderful thing. Using his new RCA C-band radar while approaching Ft. Wayne for a landing, a United Air Lines captain noticed a fox on the runway. The assistant airport manager hopped into his radio-equipped station wagon and, guided by the pilot, found the fox and shot it.

* *

We've harped many times on the need for standardized airline passenger handling procedures. So we endorse heartily and without further comment one of the recently-drafted 1956 objectives of Air Traffic Conference's ticketing and baggage committee: "To standardize to the degree possible and feasible the basic passenger-handling functions, particularly at airports, in order to reduce confusion to passengers and to increase the efficiency and accuracy of the ticketing, ticket lifting and boarding processes. . . . The confusion that normally accompanies handling of large volumes of passengers can in part be overcome by a standardization of handling that will be most convenient and efficient both for the passenger and the carriers."

* *

Kudos to Northwest Airlines for firming up its summer schedule in time to publish it a month in advance, in the April issue of *Official Airline Guide*. Pan Am and TWA have followed this practice in the international field. It's nice to have it extended into the domestic field.

Sales, Traffic, Promotion

Interiors of two **United Air Lines** DC-6Bs have been re-styled by Raymond Loewy, industrial designer. Rose, off-white and light blue are dominant, with accents of gold and coral. The lounge has a white leather ceiling, arranged in vertical pleats and tooled in gold. Other DC-6Bs will follow, and new interior design is also planned for DC-7s and first-class DC-6s. Loewy has also designed new uniforms for UAL flight crews . . .

Pan American World Airways has distributed to travel editors detailed descriptive material on England, France, Italy and Germany. An excellent job by pubrel director John Creedy and his staff. PAA says statistics show that 75% of Americans traveling to Europe spend at least part of their time in one of these four countries . . . PAA will provide 100,000 seats to Europe during June, July and August, a 20% jump over last summer. About 75% will be tourist. In June, flight frequency will be stepped up from 116 to 150 a week . . .

Ozark Air Lines will make reservations to Chicago Cubs' baseball games at all ticket offices. The offices are connected with Wrigley Field box office by teletype . . . **Northwest Airlines** named Jack May, Milwaukee, as its top sales manager of 1955 . . .

New **American Airlines** folder pictures company's present and future airplane fleet . . . **Northern Consolidated Airlines** is out with a colorful folder describing tours to its Alaska fishing camps . . .

Hertz Rent A Car System has now made it possible for international travelers to rent Hertz cars in the U.S. and pick them up at their overseas destinations. To facilitate handling of foreign reservations, company has established an international division at 310 E. 48th St., New York . . . **Avis Rent-A-Car System's** fly-and-drive plan is now in effect on 21 airlines. Passenger pays an extra $10 when buying his airline ticket and has an Avis car at destination for one day and 50 miles of driving . . .

Delta Air Lines now offering free helicopter transfer service via New York Airways between Newark Airport and La Guardia or Idlewild for connecting first-class passengers . . . Delta opened service April 1 to Charlotte, N. C.; Baltimore and Philadelphia on its Atlanta-Washington-New York route . . .

Interesting variety of European airbus tours is highlighted in new KLM-Transbus folder . . . Cubana Airlines has appointed Harry W. Graff Inc. as its advertising and sales promotion agency in New York . . . Lufthansa German Airlines opened sales offices in Los Angeles (530 W. 6th St.) and Cleveland (1010 Euclid) . . . Air France opens a new Philadelphia office on May 1 at 1422 Walnut St. . . .

NWA Orders Univac Reservations System

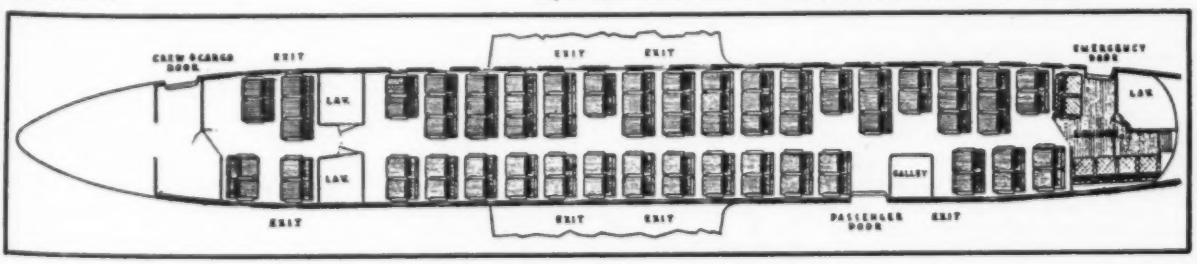
Northwest Airlines has become the first carrier to order a new electronic reservations system from Remington Rand Univac Division of Sperry-Rand Corp.

Known as Univac Airlines Reservations System, the device combines a centrally located master unit linked either directly or by communications trunk line, depending on distance, to agent sets in each reservations or ticket office. Equipment will first be used in Minneapolis-St. Paul, and possibly Chicago, and later extended system-wide.

When an agent receives a reservations request, he uses his set to determine flights servicing the destination, their scheduled dates, times and other information. These data are stored in the agent's set on coded timetables. The agent then addresses an "inquiry" to the system's master control, using punch keys on his set, and reply is received showing space availability and flight information.

After a seat is sold, the agent records the transaction with other keys. This is transmitted to master control which adjusts data related to the selected flight to show its altered status.

Drawing shows seat layout of American Airlines' 85-passenger DC-7 coach, which starts New York-Los Angeles service May 20. Six lounge seats are located in rear. Flight will be called "Royal Coachman." Standard $99 one-way coach fare will apply.



THE BULLETIN BOARD

Undisplayed Advertising: $1.50 per line, minimum charge $4.50. Cash with order. Estimate 30 capital letters and spaces per line; 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address. **Displayed Advertising:** $18.00 per column inch. Space units up to full pages accepted in this section for classified-type advertising. Forms close three weeks preceding date of issue. Address all correspondence to Classified Advertising Department American Aviation Publications, 1025 Vermont Ave., N. W., Washington 5, D. C.

Take a Heading for Reading

FOR THE BEST
MAINTENANCE — OVERHAUL — MODIFICATION — INSTALLATION
READING AVIATION SERVICE, INC.
MUNICIPAL AIRPORT, READING, PENNSYLVANIA
PHONE 3-5255

Now Available!
JARDUR, Precision-Built, Water-Resistant, Aviation Chronographs and Wrist-Watches.
At Your Local Dealer
Catalog Sent on Request
JARDUR IMPORT CO., 874 B'way, New York 3, N. Y.

Remmert-Werner

Inc. of ST. LOUIS — Lambert Field
Inc. of TOLEDO — Express Airport

Specialists in
DC-3
LODESTAR TWIN BEECH

Maintenance Inspection
Overhaul Conversion

Deluxe TWIN-ENGINED EXECUTIVE LODESTARS FOR CHARTER

by trip, or by day, week, month

For complete information, call:

NATIONAL AIRLINES

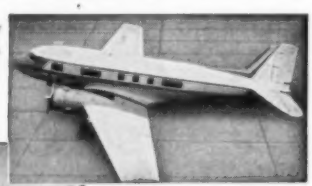
80 E. 42nd St. MUrray Hill 7-7538

OXYGEN EQUIPMENT
SALES & SERVICE

REGULATORS — MASKS — VALVES
PORTABLES & CYLINDERS
FIXED INSTALLATIONS
GOV'T. APPROVED REPAIR STATION

ZEP AERO — Phone: ORegon 8-1161, EL SEGUNDO, CALIFORNIA

NOW! The Real FORWARD LOOK
IN EXECUTIVE DC-3s
"The Tropicana"



- FULL FORWARD VISION FROM CABIN!
- 30% MORE CABIN SPACE FOR PASSENGERS!
- 300-DEGREE VIEW FROM 6 PANORAMIC WINDOWS!
  AND Luxurious Decorator-Styled Interior

NOW AVAILABLE FOR DEMONSTRATION AND IMMEDIATE DELIVERY

Unobstructed view for passengers! Soundly engineered for maximum safety and comfort! The new "Tropicana" model is L. B. Smith Aircraft Corporation's pace-setting executive DC-3!

210 MPH TRUE AIR SPEED

● Wright R1820-72AMI engines... Hamilton Standard paddle blade propellers... geared rudder tab; 200,000 BTU heater installed aft. Radio and instruments include: Bendix TA 18B 180-channel 40 watt transmitter; ARC-1 50-channel transceiver; 2 51R2 VHF receivers; Omnimag; 2 RMIs; GlideSlope; 2 ADFs; Isolation amplifier; Sperry C-4 Gyrosyn compass; AM-FM cabin radio; cabin-cockpit interphone/PA system.

Buffet-bar; hot/cold food storage; king-sized lavatory; baggage compartment.

15 PASSENGERS

Second Production Model of the "Tropicana"

Now in work....can be completed to your personal specifications in: Engines, Instruments, Electronics, Radio, Interior and Exterior Color and any interior changes desired.

L. B. Smith AIRCRAFT CORPORATION

Write, wire or call: Herrol Bellomy, executive vice president
International Airport, Miami 48, Florida

Help Wanted

RESEARCH ANALYST—leading airline in eastern city. Age 28-35 preferred. Box 950, AMERICAN AVIATION Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C.

AVIATION JOBS—Names and addresses of companies to contact, $2.00. Fitzgerald, (Chicago Division), Dept. A-18, 815 Countryside Drive, Wheaton, Illinois.

WANTED—MAJOR OIL COMPANY Co-Pilot Executive flying DeHavilland Dove, Rocky Mountain Area, under 35. Must hold valid commercial flying license, radio operator's permit, and CAA mechanic's license. Instrument rating desirable. Give full details when replying. Box 963, AMERICAN AVIATION Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C.

WANTED: VICE PRESIDENT CARGO SALES capable of organizing and heading entire cargo sales program. All inquiries will be held in confidence and should be directed to President, AAXICO, Box 875, Miami 48, Fla.

Situations Wanted

AIRLINE PILOT—now employed by east coast company as captain on Lodestar desires to make change. 12,000 accident-free hrs.; age 39; pleasing appearance and personality; excellent ref. Holds ATR, type Lockheed 18, DC-3, Curtiss C-46, DC-4. Has had admin. and flight exp. with large internat'l air carrier. Capable of conducting South American, North Atlantic, Europe & Middle East flights in Lodestars or DC-3s. Speaks Spanish. Box 965, AMERICAN AVIATION Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C.

For Sale or Lease

DEAL DIRECTLY WITH OWNER

D-18S Beechcraft 1000 hrs. inspection and re-license just completed. New cockpit instrument panel and cabin interior last year. Excellent radio, Hydromatics, new boots, one zero engine. $35,000 courtesy to dealers. Also in stock Beechcraft C-18S, Consolidated B-24 and PBY-5A, Curtiss C-46, DeHavilland Dove, Grumman Goose, Lockheed PV-1. Unlimited lease or sale all aircraft. Trades accepted.

TRADE-AYER COMPANY
Linden Airport
Linden, N. J. 3-7690

Wanted to Buy

DC-3s, C-47's, C-46's. Write, wire or call with full data on aircraft and engine time and your selling price. Contact HERROL BELLOMY, Executive Vice President, L. B. Smith Aircraft Corporation, International Airport, Miami 48, Florida. Phone: NEwton 4-0611.

WANTED: Good used late model Beech D18S or E18S. Also interested in a used executive Lodestar or DC-3 in good condition. Address: Aviation Department, P. O. Box 2408, Jacksonville, Florida.

We buy DC-3 and C-47

--- also fuselages, center sections, components, etc. Prefer runout or needing work. Airline, passenger, cargo, Wright, Pratt & Whitney, etc. State Price, time, quantity, type engines.

We are not brokers

Remmert-Werner, Inc., Lambert Field, St. Louis, Mo.

Immediate Delivery
We stock, overhaul, and install
WRIGHT R1820 -202, -56, -72
PRATT & WHITNEY R1830 -75, -92, -94
R2000 R1340 R985
and our most popular DC3 engine
R1830 - SUPER - 92
ENGINE WORKS
Lambert Field Inc. St. Louis, Mo.

NAVCO INC. Lambert Field St. Louis, Mo. PErshing 1-1710
has COLLINS
17L4 - 17M - 51R - 51V - 51X - 51Z
communications - navigation

Remmert - Werner
for
RADAR
Bendix R.C.A. C-band X-band
Lambert Field St. Louis, Mo.

ADVERTISER'S INDEX

Aero Design & Engineering Company	47	Hi-Shear Rivet Tool Company, The	16
Airborne Accessories Corporation	35	Hughes Aircraft Company	50
AiResearch Manufacturing Company, Div. of The Garrett Corp.	44	Kawneer Company, The, Aircraft Products Div.	62
Avro Aircraft Limited	1	Lear, Incorporated, Romec Division	31
Beech Aircraft Corporation	58	Marquardt Aircraft Company	17
Bendix Aviation Corporation		Menasco Manufacturing Company	51
Bendix Radio, Communications Division	39, 40, 41, 42	Minneapolis-Honeywell Regulator Company, Aeronautical Div.	71
Scintilla Division	8	Norden-Ketay Corporation	48
Boulin Instrument Corporation	52	North American Aviation, Inc.	
Bulletin Board (Classified)	76, 77	Autonetics Division	32
Clifton Precision Products Company, Inc.	73	Columbus Division	72
CONVAIR—A Division of General Dynamics Corporation	19, 56	Rocketdyne Division	53
Curtiss-Wright Corporation	74	Purolator Products, Inc.	49
Fairchild Engine & Airplane Corporation		Scott Aviation Corporation	4
Fairchild Aircraft Division	79	Sikorsky Aircraft Division of United Aircraft Corporation	12, 13
Ford Instrument Company, Div. of The Sperry Rand Corporation	55	Southwest Airmotive Company	69
G. M. Giannini & Company, Inc.	29	Texas Company, The	80
B. F. Goodrich Company, The	20	Trans World Airlines, Inc.	64
Goodyear Tire & Rubber Company, Inc., The	3	Vickers-Armstrongs (Aircraft) Ltd.	14
Hayes Aircraft Corporation	54	Western Air Lines, Inc.	6
		Wm. R. Whittaker Company	61
		Wilcox Electric Company, Inc.	2
		Willis & Geiger, Inc.	46

Pulse Of The Industry

Financial Briefs

• **The Glenn L. Martin Co.** reported $13,285,297 net profit on $271,862,342 sales in 1955 compared with $20,052,000 net on $270,730,000 in 1954. Only $1 million taxes were paid in 1954 against $10.8 million last year. The Dec. 31 backlog was $660 million.

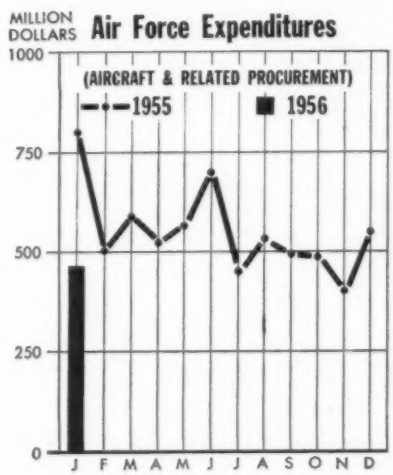
• **Republic Aviation Corp.** netted $14,731,134 last year on $547,387,242 sales against 1954's $8,976,523 on $323,456,601. Stockholders were warned that 1956 and 1957 sales and income are expected to be lower than they were in 1955.

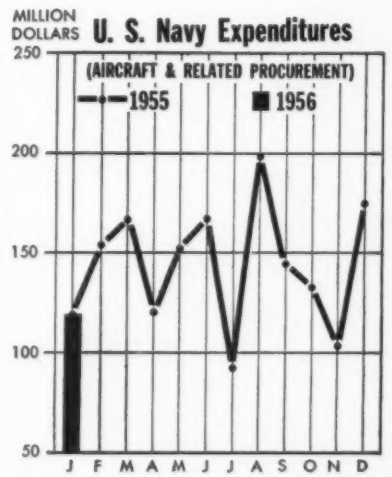
• **Hiller Helicopters Inc.** had 1955 net loss of $97,631 on sales and other income of $6,866,860, against 1954 loss of $97,709 on $6,380,677.

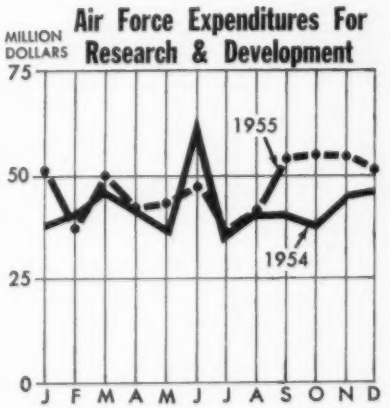
• **Kaman Aircraft Corp.'s** 1955 net was $428,815 on $14,503,869 sales against 1954's $344,046 net on $13,395,242.

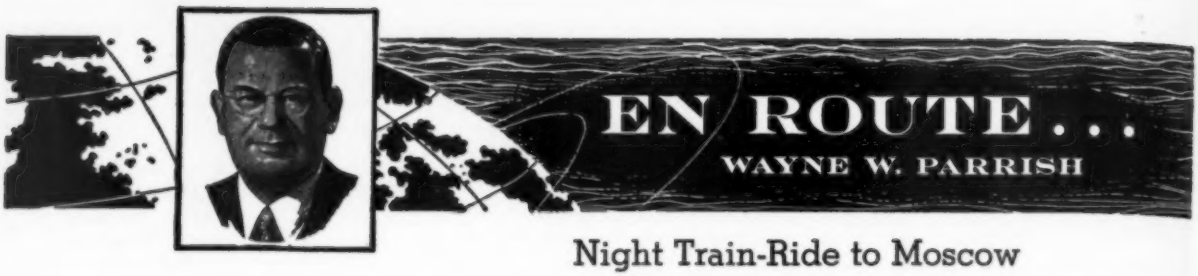
• **Pacific Airmotive Corp.** lost $817,410 on income of $19,279,537 in fiscal year ended Nov. 30, compared with $128,338 loss on $16,531,086 in previous year.

• **Braniff Airways** reported 1955 net earnings of $1,668,400 against 1954 net of $3,712,313. Mail pay and subsidy were cut $3,478,955 last year. Total revenues rose from $45,945,000 in 1954 to $46,798,600 last year, while expenses were up from $40,522,000 to $43,426,000.









Night Train-Ride to Moscow

I had decided to travel the 385 miles from Leningrad to Moscow by train. I'm glad I did. It was a fascinating trip. Also, I learned that even the most deluxe sleeper costs less than the air trip; I got a $40 refund in rubles from Intourist for my air coupon.

I was booked on the Red Arrow, the deluxe night express that leaves at 11:55 p.m. and arrives Moscow 9:45 a.m. I was told by Intourist that an agent would call for me at the Astoria about 11 o'clock and take me to the train.

After a dull evening I spent packing and playing solitaire and watching the dark figures walking through the snow outside, a porter knocked on my door at 11:05 and picked up my bag. I put on my coat, left a couple of chocolate bars for the maid, and went to the lobby.

Checking out of hotels when you're a charge of Intourist is easy. Once you pay your coupons and settle for any extras—I didn't have any—there's nothing else to do. You're not supposed to do any tipping, so I was told, but I found out in Moscow later that this is a good rule for the textbooks only.

My Intourist agent put me in a chauffeured car and off we drove through deserted streets of snow to the station. As we drove down the main shopping street the agent said this was Leningrad's Broadway and I replied, "Not quite." There were a few lighted display windows and a few neon signs but it certainly was a far cry from Broadway in New York.

Agent Disappointed

My agent was anxious to discuss the matter. He wanted so much to believe that his main street was comparable to Broadway. He asked how long Broadway was and when I told him it was about twenty miles long he seemed a little disappointed. This was typical of numerous such experiences with Intourist interpreters. New York's Broadway would have been a shattering emotional shock to him, as it must have been to the Russian delegations which visited the U.S. last summer. The U.S.A. as it exists today is truly incomprehensible to a Russian who has believed his local propaganda that everything in the U.S.S.R. is finest and best.

It also occurred to me on the way to the station what a small geographical area a Russian city covers. It's compact. When the last apartment house is reached, then it's country. Period. For all of its four million inhabitants, Leningrad could be placed in Metropolitan New York and swallowed up with scarcely a trace.

The square in front of the railroad station was well-lighted. There were very few cars in sight. We entered by the main doors into the large waiting room, equipped with wooden benches as are most railroad stations of the world. It was warm inside. We went right on through to the station platforms. Occupying the main track was my deluxe express. It was long, clean, streamlined, consisting of freshly-painted green cars. My agent found the porter for my car and saw to it that I was in the right compartment.

A Dream Come True

To say I was excited puts it mildly. Here was the culmination of a dream of many years, traveling on a night train in the middle of winter in Russia, from Leningrad to Moscow at that.

Really now, it was just like the movies and the novels. There was the steam hissing from each car, the steamed-up windows, the snow everywhere, the covered platform lights, the occasional engine whistle in the yards, all of those intriguing sounds of trains before departure late at night, and the people with their boots, fur hats and heavy outer clothing and the peasants with their rolled-up bundles in lieu of luggage.

On several tracks there were local trains. The cars were continental style with the doors along the car sides, and wooden benches, filling up with peasants for short journeys home. Opposite my train was a second class Moscow-bound train with four berths in each crowded compartment, filling up with a preponderance of men in uniforms.

My train was the plush one. It was no Twentieth Century but it was first class. Nothing but compartments and apparently only two berths per compartment. In Russia they mix up the sexes in these sleeping compartments, so I wondered whether I would have a companion and, if I did, whether it would be male or female.

I inspected my domain for the night. There were two berths, sidewise across the tracks instead of lengthwise as in the U. S. They were wide and clean. At the window was a table and a chair and on the table was a nice lamp. Over the window were blue damask drapes. A radio was playing classical music. I discovered that I shared my washroom with the adjoining compartment. Not finding a toilet, I discovered that there was one at each end of the car and that they were very clean.

My car began filling up. I was duly impressed that I was riding high this night because only top brass and the elite were arriving. Most of them were in some uniform or other and of high rank. They were the best-looking and best-dressed people I had seen so far. Some of them had fine facial characteristics. Some were accompanied by wives, also well-dressed. They were a silent group, for the most part, somber, unsmiling, just bent as everybody else in Russia seemed to be, on going about their own business. They paid no attention to me. I was apparently the only westerner on the train.

The hands of the clock on the platform began nearing departure time. Still no one showed up to share my compartment. (I was relieved that no one did.) I stood in the long aisle which runs lengthwise along one side of the train and soon the second hand reached the minute of 11:55 and the train slowly pulled out of the station, as precisely on time as it was physically possible to be.

I stood by the hall window for awhile and then I switched to the chair in my compartment. But pulling out of Leningrad at night was just about like leaving any other city. There were some factories and lights and apartment houses but I couldn't make out much in detail. The radio continued with fairly good music and the porter stuck his head in and said something in Russian. A great light dawned on me that one word was "chai" which meant tea, about the only word I had recognized in Russian. I nodded yes. In a moment he delivered a glass of hot tea with a piece of lemon and some sugar. Tea is always served in a glass placed in a holder.

Porter Anxious to Please

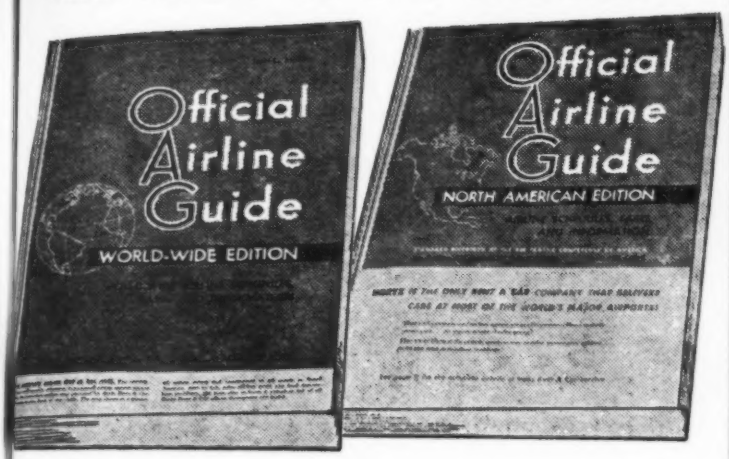
Pretty soon the conductor and an aide came and collected my rail and sleeper tickets. As with almost everyone with whom I came into contact, they were very pleasant although we couldn't converse. The porter was middle-aged, unshaven, but anxious to please.

The rails seemed to be pretty rough at the start but smoothed out later on. Our train was to average about 40 miles per hour including a few night stops. No trains travel at high speed in Russia and I was on about the best the country had. I decided to go to sleep early because I wanted to be up at daylight, so I locked my compartment, switched off the radio and turned in. The lower berth was a little on the hard side and I could have used another blanket. Sleeping crosswise over the tracks produced a new sleeping rhythm and even with a sleeping pill I didn't sleep very soundly. But I've had rougher trips in the U.S.

I awakened at several stops and looked out my window. We were at platforms but all I could see were the eerie platform lights, steam, snow and railroad workers at their jobs. Very frequently I heard whistles. We must have changed engines once or twice as there were the usual jolts of cars. Several times we passed trains going in the opposite direction but I wouldn't say traffic was overly heavy.

(To be Continued.)

FOR *All* AIR TRAVELERS and USERS OF AIR SHIPPING



A CHOICE OF *two* EDITIONS of the OFFICIAL AIRLINE GUIDE

WORLD-WIDE EDITION. Revised monthly issues. Includes every overseas stop. Destinations listed in connection with U. S. gateways and major trans-Atlantic, trans-Pacific, Latin American points. Largest international routing, fare index. Over 150,000 fares quoted, between pairs of cities. Also complete schedules, fares of all U. S., Canadian air carriers, all air carriers serving U. S. A. Other features. Over 700 pp. each issue: $19.50 for U. S., Poss., Canada, all other countries.

NORTH-AMERICAN EDITION. Revised, monthly issues. Complete schedules, fares of all U. S., Canadian air carriers; all air carriers serving U. S. A. Reader Services: Indexes. Reservations-Ticketing Section. Air Travel News. Air Mileages. Maps. Other features. Over 550 pp. each issue. $13.50 for U. S., Poss. $14, Canada. $15, all other countries.

OFFICIAL AIRLINE GUIDE
139 North Clark Street, Chicago 2, Illinois

AMERICAN AVIATION
Reader Service Card

APRIL 9, 1956
Expires 30 Days After Above Date

NAME_____

TITLE/POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE____

Card cannot be processed unless all information is given.

CIRCLE NUMBERS BELOW FOR INFORMATION ON PRODUCTS, LITERATURE OR ADVERTISEMENTS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200

For Other Information Give Page Numbers: _____

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 2455-R (Sec. 510 P.L.& R.) Washington, D. C.

AMERICAN AVIATION
LaGuardia Airport Station 71
New York

READER SERVICE DEPT.

American Aviation Reader Service

- USE THE PREPAID reply cards on this page for full information about any product or service advertised in AMERICAN AVIATION.

To get this data, fill out page numbers in spaces provided on cards. If more than one advertiser appears on a page, please fill in advertiser's name.

- FOR INFORMATION concerning New Products, Technical Literature, or equipment mentioned in the editorial pages of this issue:

Please circle the numbers shown on the reply card which correspond to the numbers appearing beneath the items described in AMERICAN AVIATION.

- YOUR REQUESTS for information will be forwarded promptly to the companies concerned.

INDUSTRY AIDS FOR THE ASKING

Useful, literature, films, etc. on a variety of technical and engineering subjects . . . free unless otherwise noted.

CORED FORGINGS. A 6-page brochure issued by The Weatherhead Co., Aviation Division, describes advantages of cored forgings in aluminum and other non-ferrous metals.
Circle No. 100 on Reader Service Card.

MICROWAVE COMPONENTS. Microwave Associates offers a 4-page catalog (56CP) that describes more than 150 different microwave components and test equipment for use in radar systems and microwave laboratory applications.
Circle No. 101 on Reader Service Card.

AIRBORNE CONVERSION EQUIPMENT. A 4-page leaflet issued by Chatham Electronics Division of Gera Corp. describes and illustrates its aircraft power supplies, tubes, selenium rectifiers and custom-built equipment.
Circle No. 102 on Reader Service Card.

SEALS, TERMINALS & CLOSURES. A handsome, indexed catalog describing and illustrating products of Electrical Industries, Division of Amperex Electronic Corp., gives full details about the company's compression seals, multiple headers, sealed terminals, transistor closures, etc.
Circle No. 103 on Reader Service Card.

PLASTICS. Cadillac Plastic and Chemical Co. has issued a 52-page catalog and price list containing information about thermoplastic and phenolic sheets, rods, tubes and films, as well as miscellaneous resins, cements and supplies the company distributes.
Circle No. 104 on Reader Service Card.

KEL-F ELASTOMER. Two brochures covering the properties, applications, compounding, vulcanization and fabrication of Kel-F elastomer have been issued by The M. W. Kellogg Co. One, a 16-pager, is designed for users; the other, a 12-pager, is of interest to rubber compounders and fabricators.
Circle No. 105 on Reader Service Card.

HYDRAULIC VALVES. Vickers Inc. offers an 8-page bulletin (A-5209) describing 17 special and standard hydraulic valves for airborne application.
Circle No. 106 on Reader Service Card.

STAINLESS STEELS. Allegheny Ludlum Steel Corp. has issued a 10-page booklet titled "The Chromium-Nickel-Manganese Austenitic Stainless Steels," containing charts, graphs and information on properties and corrosion resistance.
Circle No. 107 on Reader Service Card.

ADHESIVES. Engineering data on adhesives for honeycomb structures is given in a 20-page bulletin issued by Minnesota Mining & Manufacturing Co.'s Adhesives & Coatings Division.
Circle No. 108 on Reader Service Card.

JET ENGINE SILENCER. A brochure describing the Dura-Stack jet engine silencing system and its applications to ground run-up mufflers, fixed test cells and jet hangar maintenance units is available from Industrial Acoustics Co.
Circle No. 109 on Reader Service Card.

IMAGE INTENSIFIER. North American Philips Co.'s Research & Control Instruments Division offers a 3-page bulletin containing engineering data on a new Norelco image intensifier. Bulletin covers fluoroscopic X-ray examination of steel and other metals with high density and absorption characteristics.
Circle No. 110 on Reader Service Card.

VARIABLE FILTER. A bulletin that describes the operation and application of the IRD Model 1064 variable filter, which is used in combination with a vibration analyzer to locate causes of mechanical troubles in machine tools, is available from the International Research & Development Corp.
Circle No. 111 on Reader Service Card.

WIRE-WOUND RESISTORS. International Resistance Co. offers a 12-page catalog data bulletin containing comprehensive technical information on its tubular and flat power wire-wound resistors. The company also has issued a bulletin on its new 2-watt rheostat potentiometer.
Circle No. 112 on Reader Service Card.

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 2455-R (Sec. 510 P.L.& R.) Washington, D.C.

AMERICAN AVIATION
LaGuardia Airport Station 71
New York

READER SERVICE DEPT.

Postage Will Be Paid by Addressee

NAME_____

TITLE/POSITION_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE____

Card cannot be processed unless all information is given.

AMERICAN AVIATION
Reader Service Card
APRIL 9, 1956
Expires 30 Days After Above Date

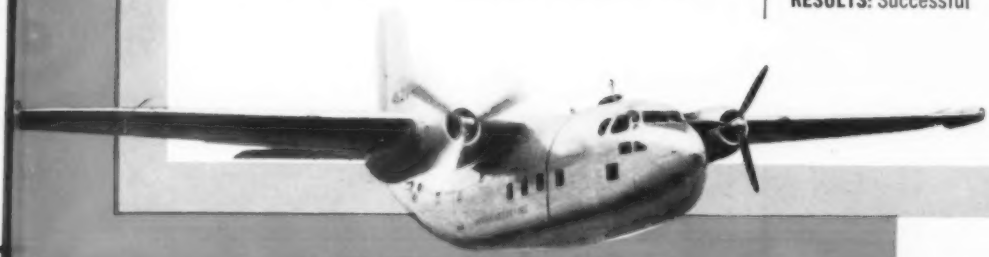
CIRCLE NUMBERS BELOW FOR INFORMATION ON PRODUCTS, LITERATURE OR ADVERTISEMENTS

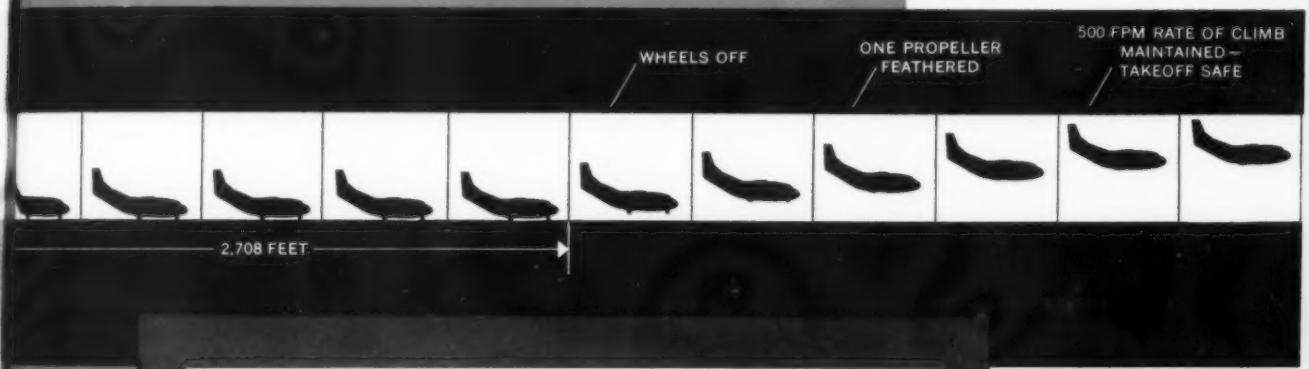
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200

For Other Information Give Page Numbers:_____

C-123 TURBOJET COMBINATION PROVES OUTSTANDING

MISSION: Combat Test Problem
WEIGHT: 13,000 lbs. Overload
TAKEOFF CONDITION: Power Failure
RESULTS: Successful





In a recent test for the U. S. Air Force, the Fairchild C-123 proved the value of thrust assist in meeting emergency single engine conditions!

A C-123 was equipped with two Fairchild J-44 jet engines and loaded to achieve gross weight of 66,742 pounds – *13,000 pounds overload.*

During takeoff and climb, both jets were operated to provide 2,000 pounds continuous thrust in addition to the two piston engines. At 2,708 feet, wheels were off the ground, and a moment later at a speed of 122 knots, one propeller was feathered!

From this takeoff position, the C-123 climbed out at 500 feet per minute – proving again its *big job capability and assault versatility,* heightened by jet augmentation to give extra power and extra safety in any emergency.

A Division of Fairchild Engine and Airplane Corporation

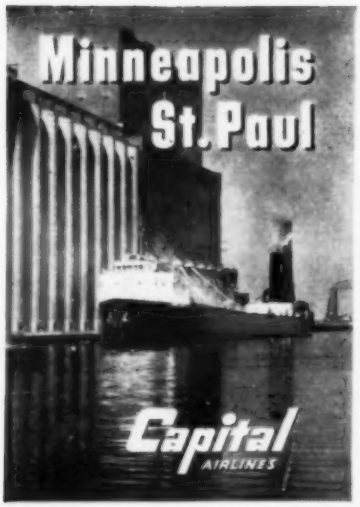
WHERE THE FUTURE IS MEASURED IN LIGHT-YEARS!

FAIRCHILD

AIRCRAFT DIVISION • HAGERSTOWN, MARYLAND

DETROIT PUB LIBRARY
TECHNOLOGY DEPT
96 PUTMAN AVE
DETROIT 2 MICH
10-58 8
5305-55

...served by Capital Airli... major industrial centers such as Pittsburgh, Cleveland, Detroit, Chicago, Buffalo and Birmingham — important ports including Philadelphia, Mobile, Baltimore and Norfolk — also Memphis, Knoxville and Atlanta — all are reached by Capital's routes.



500 flights... 93,000 miles every day...

a Capital job for TEXACO!

Capital AIRLINES operates 500 flights daily between 75 major cities in the United States . . . a total of 93,000 miles every day. One of the nation's oldest and largest scheduled airlines, Capital has achieved an outstanding 28-year record of efficient, on-time air service.

Top engine performance is, of course, a vital factor in assuring the dependability for which Capital Airlines is famous. To get it, Capital relies on *Texaco Aircraft Engine Oil* for all engine lubrication.

Leading airlines everywhere do the same. In fact —

During the last 20 years, more scheduled revenue airline miles in the U.S. have been flown with Texaco Aircraft Engine Oil than with all other brands combined.

Let Texaco help improve and economize your operation. Ask a Texaco Aviation Representative for full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, *Aviation Division*, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

Circle No. 23 on Reader Service Card.